VOLUME 10 #4 JUNE 1995 PRICE $6

FOR THE DESIGN, CONSTRUCTION AND ENJOYMENT OF UNUSUAL SOUND SOURCES

EXPERIMENTAL MUSICAL INSTRUMENTS

EVEN THE VIOLIN

It is the most tradition-bound of instruments in European music. Yet even the violin is not immune to experimentation. In the early days of acoustic sound recording, the need arose for a violin with a stronger, more focused sound, with frequency output more in keeping with the limited response of the early recording devices. ...

... The answer appeared in the invention of an instrument thoroughly violin-like in its way, yet having an entirely new mechanism for vibration transmission and radiation. It was the *Stroh Violin*, shown on this page. You will find a full description of this extraordinary early 20th-century instrument in Cary Clement's article in this issue of *EMI*.

Also in this issue we have surrealist musings become physically manifest in the instruments of Johannes Bergmark, ideas for speed bump sound art, an essay and resource guide on natural sound recordings, more on bamboo for musical instruments, notes on the archaic European *Lautenwerk*, plus the usual reviews, letters, notices, and much more. All waiting within.

Open now, and read.

IN THIS ISSUE

Photo above: Stroh Violin. See the article starting on page 8, and the caption on page 15.(Photo courtesy of the Shrine to Music Museum, Vermillion, South Dakota)

LETTERS

AM I GLAD that someone else is hearing those low vibrations [referring to Dennis Murphy's letter in the last issue, describing oft-heard low-frequency sounds of unknown origins, and in turn referring to Q.R. Ghazala's article on "strange Earth voices" in the issue before that]. For a while I thought perhaps the aliens were going to examine me!

Usually, I hear this low-low vibration in the middle of the night and it is rather irritating as it is difficult to say if this hum comes from inside the body/brain or outside. I can usually hear it better when lying down but if the refrigerator kicks on it cancels out this mystery hum. Some of my rationale about this covers such things as Alpha rhythms, hearing the end of the big bang, in ground water pumps, and big, high flying, jet planes rattling the ground. Whatever it is, I only hear it at night and it seems fairly short in duration – 30 minutes or an hour, though it could be happening at other times but is being masked by ambient sounds.

My favorite explanation is the jet plane sympathetic vibration but this surely would not explain Dennis Murphy hearing it for two months straight. I plan on writing the American Dowsers Society as they thrive on this kind of thing. I would really like to solve the mystery of this maddening hum.

GREAT HORNED OWL. Its call is typically 4 - 7 low hoots.

Richard Waters

NORTHERN HARRIER. Typical call is about ten short, sharp whistles.

PS: While searching the library's computer system for subject "mystery sound" (a recommended search) I happened upon another entry that I thought you may be interested in: An article in the New York Times (Aug. 24, 1993 p.C13+) entitled "The Theremin: The Man, Music and Mystery... and now, the Movie." apparently about a documentary film by S. Martin on the life of Leon Theremin and his musical invention, the theremin. Perhaps you've heard of this, perhaps not...either way I've told you now, so you can't not know.

FROM THE EDITOR: The **People** article "Hmmmmmmm....," by Pam Lambert and Michael Haederle, describes a hum at 17 - 20 Hertz, source unknown, which, at the time the article was written was driving to distraction those among the residents of Taos, New Mexico whose hearing range happens to extend down below 20Hz. Regarding the Theremin documentary: It had short runs in Britain and some major U.S. cities – or was it on public TV? – and was reported, by several who got to see it, to be an excellent film.

INDIGO BUNTING. The song, especially conspicuous at midday, is long and varied, with most phrases paired.

UPON READING in the March 1995 issue a letter to the editor from reader Dennis Murphy about a mysterious environmental sound, I immediately thought of this article I had read in *People Weekly* Magazine (9/21/92) entitled "HMMMMMMM...?" I had been quite interested in the article and had kept it, but upon looking for it, I couldn't find it, so I searched in the library and found it. I'm sure it will be of interest to you and your readers, and I have also forwarded a copy of the article to Mr. Murphy.

I found it especially interesting to note that Mr. Murphy's letter noted that he could hear this unidentified noise 30 miles from where he lives, which is the exact distance specified in this article as being the distance (in any direction) that one witness could hear the Taos, New Mexico noise.

This, of course, raises the questions: Could these two separate occurrences spring from similar causes? How many more of these mysterious, site specific noises are there?

I suggested to Mr. Murphy, and I also suggest to you that some investigation be done into the Taos noise to see whether or not the cause of the noise was found since September 92, so that perhaps a similar cause might be found in Vermont. Without a doubt, these phenomena are worth looking into.

I would very much appreciate hearing about any information that is obtained on this subject. I'm sure the rest of *EMI*'s readers would also.

Thanks to Mr. Murphy for starting what could be a very interesting dialogue.

c. reider
PO Box 1204, Lyons, CO 80540-1204 USA

SONG SPARROW. Its song is lively and varied, often many short notes and a trill near the end.

EXPERIMENTAL MUSICAL INSTRUMENTS
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Subscribers can place relevant "classified" ads of up to 40 words without charge, and they will receive a 15% discount on display ads.

SUBMISSIONS: Experimental Musical Instruments welcomes submissions of articles relating to new or unusual musical instruments. A query letter or phone call is suggested before sending articles.

NOTES FROM HERE AND THERE

TONE AND NOISE: The most recent issue of *Leonardo Music Journal* (Volume 4, 1994) contains an article on an aspect of musical sound that would seem to be fundamental, yet which isn't often addressed directly. The question it addresses is the sort of thing that people working with experimental musical sound sources become increasingly aware of as their ears sharpen and their acuity in interpreting sound develops. All of which make the article worth noting here.

FULVOUS WHISTLING DUCK. Its call is a series of shrill whistles.

The article is "The Fusion and Layering of Noise and Tone: Implications for Timbre in African Instruments," by Cornelia Fales and Stephen McAdams. It is a study of the manner in which sound elements of clear pitch (i.e., tone) blend with unpitched sound (noise) in complex musical timbres. The heart of the matter here is percept: given a sound that is a blend of pitched and unpitched elements, to what extent does the ear hear it as a single sound of complex timbre, as opposed to a layering of distinct and separable sounds? And how do the noise components affect the listener's perception of pitch?

Giving their work some grounding in the real world, the authors begin with the observation that a number of definite-pitch instruments from the African continent have secondary sounding elements, such as attached rattles, designed to impart a dose of unpitched sound to the overall tone color. Some other African instruments have broad-spectrum noise built into the tone even without separate additional noise elements, as with certain breathy-toned flutes. Most classical European instruments, by contrast, are designed to minimize unpitched noise within the timbre.* It's worth noting here that virtually all musical sounds – excluding only the most boring of electronic concoctions – involve varying admixtures of periodic (pitched) elements and a-periodic (pitchless) elements, and that these blends are essential in determining an instrument's timbrel personality. Thus, these noise/tone questions are relevant to instrument makers everywhere.

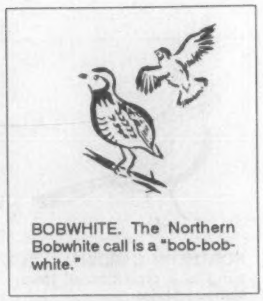
AMERICAN ROBIN. The song is a series of 6 - 10 whistled phrases of three or four notes.

The article's authors conducted a series of listening tests with volunteers. They played various tone/noise blends for the listeners. The listeners responded to questions concerning the extent to which they perceived the different blends as having distinct pitch, what those pitches were, and whether they heard the samples as single, blended sounds or multiple sounds layered upon one another. The article reports on the results and offers some interpretation, in addition to providing contextual and background information.

For where-to-get information on the article, see the listing under "Recent Articles..." on this issue's back page.

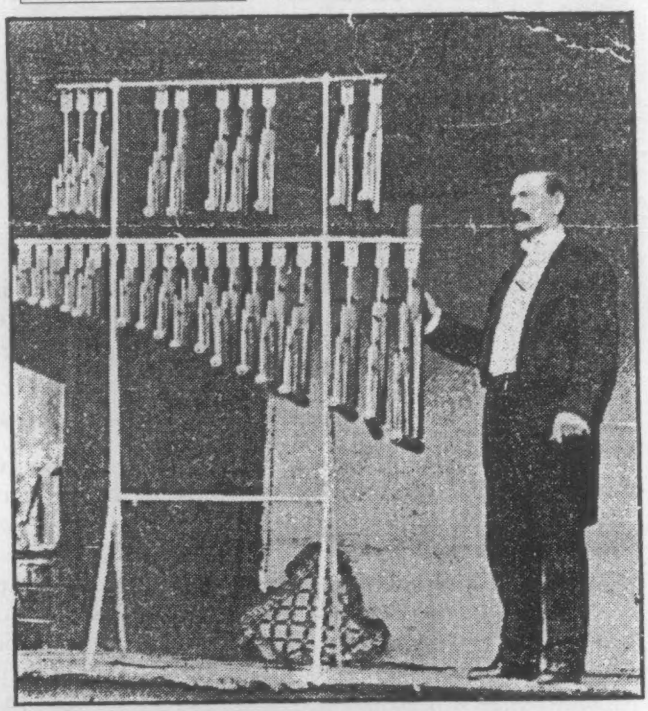
*As long as we're making such generalizations, we can add that classical European instruments tend to emphasize a strong fundamental and lower harmonics, while many Eastern instruments (sitar and other buzzing-bridge instruments; various double reed instruments, etc.) emphasize strong high harmonics. [David Courtney made this observation in his article "Bridges: An Indian Perspective" in EMI Vol. VII #5]. Many African instruments, additionally, favor non-harmonic overtone blends, as with most kalimbas, marimbas, or drums. There are plenty of exceptions, of course.

MORE DEAGAN CHIMES: Appearing in the photocopied image below is Mr. P. Waldo Davis, "manipulator of Deagans triple toned Golden Chimes." The photo is from a 1915 brochure promoting Mr. Davis' concertizing on the angklung-shaped metal chime sets manufactured by J.C. Deagan and company from the turn of the century until some time in the 1920s. "NO Auditorium too LARGE for these TONES TO PENETRATE," asserts the brochure. The instrument here called Golden Chimes is part of Deagan's line of Organ Chimes or Shaker Chimes, featured in an extended article in *EMI* Volume IX #2, December 1993. This particular set has remained in the family, and is now being offered for sale by Mr. Davis' granddaughter. See her ad in this issue's notices section for details.



BOBWHITE. The Northern Bobwhite call is a "bob-bob-white."

WHOOPING CRANE. Its call is a vibrant trumpet note.



SOCIETY FOR THE PROMOTION OF EUPHONIC AMPHORICISM

Here's a useful word: "Amphoric" appears in *The Concise Oxford Dictionary* as "Like the sound produced by blowing into large vessel with small mouth."

Large vessel with small mouth is a pretty good descrip-

THE BIRD DRAWINGS ON THESE PAGES are by Robin Goodfellow. The accompanying descriptions of their calls are taken from *Birds of North America: A Guide to Field Identification* (Thomas B. Allen, Ed., Western Publishing Co., 1983). The drawings are part of *EMI*'s ongoing celebration of the sounds of nature. The theme continues in this issue with René van Peer's "Nature on Record," a wide-ranging essay/review/resource list on available commercial recordings of natural sound.

NORTHERN CARDINAL. Its song is a repetition of loud slurred whistles.

tion of what acousticians know as a Helmholtz resonator. The reference is to an *amphora*, which, as museum visitors and people with old fashioned classical educations know, is a Greek or Roman two-handled jar or vase.

WE FAILED TO PROVIDE where-to-purchase information for the *West African Djembe Drumming* video included among EMI's last issue's video reviews. The video is available from Mandala Percussion, 1390 S. Potomac St. #136, Aurora CO 80012; phone (800) 858-2822.

MUSICAL INSTRUMENT EXHIBITS, PERFORMANCES & OPPORTUNITIES COMING UP

Nexus Foundation for Today's Art in Philadelphia will feature an exhibit entitled *Innovative Instruments* June 30 through July 28, 1995, featuring sculptural exhibits by artists, as well as performances and videos. It is presented in conjunction with a city-wide John Cage festival coordinated by the Philadelphia Museum of Art. Nexus is at 137 N. 2nd St., Philadelphia, PA 19106; call (215) 629-1103 for information. Sound sculpture and instrument makers interested in exhibiting, see more information in the ad in *EMI*'s Notices section, this issue.

RUBY CROWNED KINGLET. A low-pitched, short, 2-note warbling call. The song is high & weak at the start and end, with loud ascending triplets in the middle.

Lincoln Center Out-of-Doors celebrates its 25th anniversary during August 1995. On Sunday August 13th the festival will inaugurate a new mini-series, *Homemade Instruments Day*, dedicated to experimental acoustic musical instruments. There will be workshops, installations and performances by artists from near and far. There will also be an international photo installation of instruments and their inventors. Sound sculpture and instrument makers with photos of their work suitable for such an exhibit should see the ad in the Notices section.

IN EMI'S LAST ISSUE we had a review of the posthumous CD of music by Ivor Darreg, *Detwelvulate!* Most of the music on the CD was taken direct from Ivor's live keyboard performances, recording to computer disk with MIDI interfaces. The CD's producer, Brian McLaren, engineered the sessions and then did the production work for the CD. The review indicated that Brian's role was an important one in "orchestrating" the performances (selecting which synthesized voices to use for the musical lines in each performance), as well as in after-the-fact musical editing. Brian's role was indeed a crucial one, but he has written to clarify that the CD represents Ivor's playing, ideas and intent much more nearly unaltered than the review suggested, while his own musical input was less. To summarize his comments, he notes that any editing affecting the musical performance (such as removing obviously wrong notes) was very minor. In addition, most of the synth voices used were the ones that Ivor himself chose at the time of performance. In a smaller number of cases, the intended synthesizer tone could not be used due to certain technical problems, and in most of these instances near-identical tone qualities serve as replacements. "In well over 60% of the tracks on the CD," he notes, "nothing was changed."

CALIFORNIA QUAIL. Its call has three slurred notes, the middle one highest & loudest.

MORNING WARBLER. Short and soft call, typically a 5-note warble.

A NEW BOOK BY BART HOPKIN, editor of *Experimental Musical Instruments*, has just been published by Lark Books. *Making Simple Musical Instruments: A Melodious Collection of Strings, Winds, Drums & More* is a collection of plans for home-buildable musical instrument, ranging from simple to moderately difficult. The people at Lark books did a **wonderful** job with the graphic design, layout and printing for this book. The book is written for a general, non-specialist audience, and the approach is non-technical. The instruments presented aren't so very far out: most of them, by design, relate closely to familiar instrument types and are playable as such. Yet even experienced experimenters will find some new ideas here. It's hardbound, with 144 big and very full pages, beautiful photos & illustrations, lots of color; price $24.95. You can order from Experimental Musical Instruments, PO Box 784, Nicasio, CA 94946, USA, phone (415) 662-2182. Or, for Mastercard or Visa orders, order direct from Lark at (800) 284-3388.

As a personal note, let me add to the above description a little history, for anyone who might be interested. I'm putting it in small print, so as not to appear to be taking up too much space with my own business:

Quite some time ago now, I (Bart, EMI's editor) had a contract with a publisher called Betterway Press to write a book to be titled **Principles of Musical Instrument Design**. It was to be an all-around practical resource book on instrument making, providing the sort of rudiments that would allow builders to design instruments of all sorts intelligently. This stands in contrast to instrument-making books already on the market, which provide specific plans for specific instruments, but don't convey underlying design principles in a thorough-going fashion. I felt that a "Principles of" book would fill a real need, albeit for a rather small audience. So I put in a **heckuva** lot of work and made a big, very full book; and I arranged to have a generous handful of knowledgeable people in different facets of the field read, criticize and correct the early drafts (**many thanks** to those generous individuals). But, as things so often seem to go in the publishing industry, just around the time I was completing the manuscript, Betterway was bought out by a conglomerate called F&W. F&W, without seeing the manuscript, decided it was not in their interest to publish it. (The "rather small audience" factor just alluded to may have had something to do with this decision.) The rights came back to me, and I began to shop the manuscript around to other publishers. No less than three of these publishers came back with the same response: this book is too technical and too narrow in its target audience for us, but we would be interested in publishing a simpler book in the form of a set of home-buildable instrument plans. The first two times I heard this offer I declined. The third time it was Lark Books making the offer, and I was struck by a certain unavoidable fact: every book I saw that Lark had put out was beautifully done. So I said OK, and set to work on **Making Simple Musical Instruments**. And I've not regretted that OK, because, as I said above, the people at Lark did a wonderful job with the book.

TUFTED TITMOUSE Its whistled song is two notes, or one slurred note, repeated 2 - 4 times.

Meanwhile, the **Principles of Musical Instrument Design** manuscript remains unpublished despite continuing efforts. I still feel that the book fills a real need as yet unfilled, and it is my intent to make it available sooner or later, one way or another. For reasons having to do with production quality as well as distribution, it would be better to have an established publisher for it, but we do have the option, should no publisher turn up, of self-publishing through *EMI*. Stay tuned.

NATURE ON RECORD

Part 1

by René van Peer

In memory of my stepfather Bère Schoones (†April 1, 1995) who had a deep love for and a great knowledge of nature

When Bart Hopkin mentioned an idea he had to devote pages in EMI to sounds from nature, I asked him if I could also be involved. My interest sprang from various sources: curiosity for the kinds of sounds I might come across; awareness of the fact that such soundings have always (for a variety of reasons and purposes) been used by the human species in a cultural context; awareness that submitting these sounds to any medium irrevocably and fundamentally alters their character.

He had invited people who record natural sounds to submit articles about their work. He also wanted a discussion of material extant on cassette, vinyl or CD. When I visited him in the Fall of 1993 it was decided that I would take that upon me. Bart had already collected several albums; in the course of the following year I obtained more through various channels. In the summer of 1994 the Canadian magazine Musicworks *printed my article "Art of Coexistence" which touches themes related to those in the present article.*

"Nature on Record" is by no means exhaustive; but then completeness has never been the aim, nor could it have been. It will come in two parts, appearing in this issue of EMI and the next, both containing a list of records and details of labels and distributors.

The area of sounds from nature on record is variegated and, above all, large. On one end of the scale there are people who mix sounds of the elements with classical evergreens, and release the result on albums; thus dishing up surreal scenes such as a Bach chorale being played on a grand organ on the shoreline. On the other end there are numerous albums of 'pure' sound, on which the human intervention (and therefore, presence) is less obvious. The intention often is to evoke images of natural domains that are untouched by human hand. However, the placing of the microphones, the filtering of the sound spectrum, the selection and the processing of material, the objectives for playing such an album: all imply human schemes. Perhaps if I could put such thoughts aside, my appreciation of the matter at hand would be different. As it is, only on rare occasions can I forget that there is always at least one human hand to position and hold the microphone, and another to switch on the recorder.

For me, these recordings rarely work as a sonic sedative, which is how they are mostly promoted. On the contrary, I always come across sounds that arouse my curiosity, that tickle my fancy, that set my mind at work. I quite like that. Also, it somehow pleases me to find that what the human species has devoted a huge amount of effort to (sophistication in sound production) has been vocalized year in year out since time immemorial by beings that we consider less developed than ourselves. However this may be, in the end these animal voices as such speak with uncommon strength.

SKETCHING A MAP (ROUGHLY)

The purposes of catching natural sounds and then releasing them on sound bearers are manifold; they determine the form of the output to a large extent. There are the sound guides, giving brief fragments of animal calls; these are ostensibly put together for reasons of identification. Other recordings are meant to be scientific demonstrations of animal sound production. Another approach is to release recordings in the form of soundscapes or nature concerts, portraying animals as part of their surroundings but also introducing the notion of aesthetics to recordings of pure wildlife sounds. Most of the work concentrates on birds; there is quite some stuff around featuring whales. But outside those categories: nothing. Or rather, virtually nothing. The exceptions are quite intriguing.

Another development shifts the emphasis from animals to the environment itself in acoustic impressions of glaciers, pebbly brooks, all types of weather, and so forth. I will not discuss urban environments and sound effects here, as they belong to the area of man-made sounds and therefore fall outside the scope of the present subject. Finally, there are some extraordinary human reworkings and interpretations of animal sound, other than just notating it for orchestra or putting the vocalizations on the procrustean bed of harmonic construction.

Inclusion of recordings in any of these 'categories' does not mean they could not belong in another. In some cases they are put together for convenience's or for argument's sake. Some records would easily fit in more than one. Others form categories of their own. Which makes them all the more interesting.

SOUND GUIDES

Just as field guides are employed to recognize birds on sight, sound guides enable the bird spotter to find out what species make themselves heard. Although the procedure must have been cumbersome in the age of vinyl, the principle as such is valid: there's quite a number of birds that call when hidden; some species look alike but can be distinguished by their voices. These albums usually contain masses of different species, each represented with short fragments of its vocalization. Generally speaking, such albums will be most valuable to bird fanciers who use these recordings to acquaint themselves with sounds they might come across, when preparing to go out in the wild. The advent of the CD must have meant a great step ahead, making it possible to carry a portable player and a set of albums, and matching track and live bird on the spot. In the United States, the Laboratory of Ornithology at Cornell University in New York state is an active producer and distributor of sound guides. The catalog of the British distribution company WildSounds holds an astonishing variety. Between them these two are able to sell you the sounds of the vast majority of birds on this planet – on vinyl,

on cassette and on CD.

The Russians also used to be active in this area. Melodiya released a collection called *Voices of Birds in the Nature,* recorded between 1959 and 1965.[1] This is a box of five 10" discs, covering the former Soviet Union from West to the Far East. Unfortunately, they opted for a narrator who introduces, discusses and describes every bird in a particularly patronizing tone, This human agent has been allotted a role that is of greater importance than that of nature itself, which somehow adequately reflects how people in general treat their natural environment.

One title that may be appealing to a wider range of people is Sittelle's *Our favorite garden birds,* that finds its American counterpart in Cornell's *Backyard Bird Song.* It is all there within reach: the birds and the album, inviting curious listeners to find out what is stirring and singing around their homes and in nearby parks. I do use the Garden Birds CD every once in a while. Perhaps it is something of an academic delight to know what bird is calling out from one thicket or other at the back of my house, but I do derive pleasure from it.

Two of Cornell's sound guides illustrate how different they can be. "Experience Cuba," is how the Lab advertises its *Bird Songs in Cuba.* The record falls regrettably short of expectations raised by those two words: it does not evoke a sonic portrait of any landscape. The calls and songs are much too isolated and fragmentary to be experienced as a convincing picture. *Voices of the Peruvian Rainforest,* on the other hand, is a beautiful piece of work. Set up as a guided tour the narrator first tells about the behavior and the surroundings of a species, then the sound itself comes on. The recordings are of exquisite quality. You'll hear each animal as part of its environment. Many of the species call out in amazing voices, often reminiscent of electronically generated sounds; you'll also hear how much variation there is in acoustic space and reverberation. Sometimes there seems to be an unlimited expanse; sometimes the calls go around flat and square, bouncing off what sounds like a dense palisade of trees.

Two other guides are worth mentioning. Sittelle's *Grenouilles et Crapauds* contains the calls of 20 different European frogs and toads. There are croaks, creaks, rasps, barks, burps, whistles, hoots; in solos, dialogs and choruses. One group of toads brings to mind panflute music from the Solomon Islands. The second, *Animal Sounds of Hungary,* gives an impression of wildlife in that Middle European country. It contains rarities such as slowed down recordings of a bat, a shrew and crickets, such as a cicada sounding like an electronic buzzer. Here one also finds an abundance of frogs in dazzlingly complex, hypnotic textures; but to top it all there is the standard classical music set-up in amphibian form: a "frog quartet," consisting of two Fire-bellied Toads, a Tree Frog and a Green Toad.

In some cases, separate recorded sound guides are included.

DEMONSTRATION RECORDS

This is a category that I have a soft spot for, no matter how dry some of the records may be. They embody a complex of approaches that seems to have vanished with the progression of time: pure curiosity; academic idiosyncrasy; the wish to document the findings for a larger audience. The lines between scientists and record labels somehow were considerably shorter in the fifties and sixties than they are nowadays. The producers explored territory that was new at the time, and did so with apparent pleasure and dedication. They made analyses of animal sounds using methods that were as elegant as they were simple, and made the results perceptible to whoever cared to listen: the original sounds were enlarged, either by putting microphones close up or by slowing down the recordings.

The earliest example that I have been able to lay hands on is *Music and Bird Songs,* a radio presentation from 1952 that was transferred to vinyl. It was produced by Peter Paul Kellogg, professor of ornithology and biological acoustics at Cornell University and founder of the Laboratory of Natural Sounds, and by James H. Fassett, presenter and supervisor of music with CBS Radio. *Music and Bird Songs* was the result of experiments by professor Kellogg and CBS' chief tape editor Joel Tall in 1951. Its aim was obviously to show how musical these vocalizations actually are: as if by magic, chirping and twittering turn into melodies and timbres that can be sublime as well as uncanny. The presentation also demonstrates the astonishing ability found in many birds to produce different sounds simultaneously, because they can control the sides of the sirynx (the tubular vocal organ of birds) independently.

The most recent example is *The Unknown Music of Birds* (1987),[2] an LP on which the Hungarian researcher Dr. Peter Szöke condensed thousands of recordings that he had collected over the years. He studied the relation between music and bird song from a positivist angle. According to him it is the structure of a song that determines whether or not it is musical. The species that he uses to support his theory sing regular intervals, regular rhythms, transpositions of melodic lines and strophic forms – which is amazing. But then he also has a category of species singing "forms of non-musical[3] tonal structure ... our 'contemporary music' in birds." He ranks the Winter Wren among these. "Appealing...remarkably complex...sounds like expert whistling...I love that plaintive little slur at the end...sublime," is what Fassett says about the American variety of the same species – but then in the same breath dubbing the Loon's melancholy wail "ridiculous." Which sounds a bit like aesthetics gone haywire.

Szöke, who categorizes the Loon's call as a "complex musical motif," wanted to avoid the pitfalls of aesthetic judgment. To this end he took musical conventions as the basis for his theoretical framework, oblivious of the fact that these too developed along subjective lines and will change according to fashion or insight. Szöke made it his lifework to go through countless fragments, eventually deciding whether they did or did not support his theory and then discarding those that didn't. Kellogg and Fassett seem to enjoy the wonders they have come across when slowing down the speed of their tapes. They, more than Szöke, worked from a policy of inclusion. Above all, *Music and Bird Songs* shows an open-minded view on music, that is still very pleasurable.

Folkways used to have a 'Science' series, with titles like *The Birds' World of Song, The Lyrebird, Sounds of North American Frogs* and *Sounds of Insects. The* first two albums are further explorations into the structure of bird song. *The Birds' World of Song* was recorded by Hudson and Sarah Ansley. In 1954 Hudson Ansley[4] had published an article in which he argued that many birds hear better than we do, in two senses: they distinguish successions of notes so rapid that we do not hear them as separate entities, and they discern tonal differences in the high

1. Available through WildSounds.

2. This was before the fall of socialism, of course. Capitalism would have precluded the release of an album such as this. No commercial potential. Some copies still available through Sittelle.

3. Szöke defines non-musical tones as sounds having continuously changing, gliding or other irregular pitch.

4. I tried to trace Ansley for interviewing him about his work, without success.

registers. On the record Ansley shows how the Mockingbird, when imitating the Whippoorwill, articulates five syllables as the mimicked bird does, whereas we can make out only three. He also analyzes songs of several kinds of birds. He identifies tiny snatches of tunes, shows how they may vary between individuals of one species, and how they can be heard with slight differences in different species. He compares singers with only a few songs to those that have an apparently boundless repertoire, the Mockingbird a champion with 276 different songs, *La Cucaracha* one of them.

The Lyrebird takes structural analysis to a level of higher sophistication. According to K.C. Halaloft this species could well be the best avian singer in the world. Not only is the Lyrebird an accomplished mimicker (of sound sources in its vicinity, be they other birds or inanimate objects), not only does it produce a sheer endless range of timbres (from melodious to percussive), it also puts these together to striking effect – the bird is actually composing in the academic sense: a conscious arrangement and manipulation of sound material. In his analysis Halaloft draws parallels between the structure of Igor Stravinsky's *Symphonies for Wind Instruments* and the song of a Lyrebird. Listening to this animal gives me the sensation of an improvised concert. Matchless sounds and a wild, anarchic personality. When slowed down the sounds become even more intriguing, with accelerating arpeggios and an effect resembling early echo boxes used in rock 'n' roll.

The tracks of *Sounds of North American Frogs* would just fit on a single CD, as there are 92 separate entries on this tape. This is perfect material for a frog museum, and it's great to listen to. The diversity in calls of these amphibians is approached from different sides. Given the time of release (1958) the recording quality is surprisingly good. This album comes close to being a sound guide, but then there are beautiful environmental portraits as well and explanations for the differences in frogs' voices. One of these is that a connection exists between size and pitch: the call of a small frog slowed down to half its speed sounds exactly like that of a related species twice its size. The liner notes are lavish and interesting; they come with 53 pictures, among these the Little Grass Frog sitting on a fingernail.

In comparison the quality of *Sounds of Insects* is more ambiguous. The sounds come from the tiniest of creatures, which is a feat in itself; it features different stages in the flight of insects, their footsteps, and the creepy chewing of wasps. It also shows signs of having been done too quickly. Especially the way in which Albro T. Gaul recorded his own narration, impresses me as careless. Nevertheless, a record of insect sounds is exceptional. As Gaul writes on the insert: "They may be listened to as a technical study, or as a background to thoughts of summertime and days spent in the country."

This atmosphere of halcyon, dogdays leisure is captured in *Crickets and Katydids, Concerts and Solos* by Vincent Dethier. It is an account of field trips around New England during three consecutive summers in the early thirties to collect and identify as many species of these insects as possible. Dethier sets his experiences and his descriptions of these songsters (or sawyers) in a mood of relaxation that is as desirable as it has become unattainable. Fresh as dew, this book. More about it next time, when I will discuss soundscapes. Lie back, close your eyes and let the buzzing approach.

LIST OF ALBUMS DISCUSSED IN THIS ARTICLE

Ansley, H + S	The Bird's World of Song	1961	Tape	Folkways 06115
Bogert, Charles M.	Sounds of North American Frogs	1958	Tape	Folkways 06166
Gaul, Albro T.	Sounds of Insects	1960	Tape	Folkways 06178
Halaloft, K.C.	The Lyrebird	1966	Tape	Folkways 06116
Kellogg, Peter Paul	Music and Bird Songs	1953	Tape	Cornell Lab of Orn
Ország, Mihály	Animal sounds of Hungary	1992	Tape	Hungaroton MK 19151
Parker, Theodore A	Voices of the Peruvian Rainforest	1985	Tape	Cornell Lab of Orn
Reynard/Garrido	Bird Songs in Cuba	1988	2LP	Cornell Lab of Orn
Roché, Jean C.	Our Favourite Garden Birds	1992	CD	Sittelle 04708
Roché/Guyetant	Grenouilles et crapauds	1991	Tape	Sittelle 10613
Szöke, Peter	The Unknown Music of Birds	1987	LP	Hungaroton LPX 19347
Veprintsev, ea	Voices of Birds in the Nature	1965	10" LPs	Melodiya

Crickets and Katydids, Concerts and Solos, by Vincent Dethier (1992, Harvard University Press)

ADDRESSES

Sittelle, rue des Jardins, 38710 Mens, France

Cornell Lab of Ornithology (producer of **The Crows Nest** catalog), 159 Sapsucker Woods Road, Ithaca, NY 14850 USA

WildSounds, Cross Street, Salthouse, Norfolk NR25 7XH, UK

Smithsonian/Folkways Mail Order Service, 416 Hungerford Dr., Suite 320, Rockville, MD 20850, USA

The recordings listed here are but a few of the many availble. You can obtain more complete listings by requesting catalogs from the companies listed above.

AUGUSTUS STROH AND THE FAMOUS STROH VIOLIN

or

"The inventors of Abnormalities in the field of violin-building have not yet become extinct"

by Cary Clements

It is the experience of all inventors of devices for the improvement of the violin that one has the greatest difficulty in opposing the traditions which surround the instrument.

— Stroh catalog.

The first time I laid eyes on a Stroh violin was at the Smithsonian Institution about ten years ago. As I was strolling through the musical instrument section I came across one reposing in a glass case. What is this thing? This thing with a horn. Its awkward beauty impressed itself on my senses. It's whole look made me think of that vague era long ago before the electronic age, when record players had horns. And motorcars had horns that you could see. But violins?

The second time I saw a Stroh violin was only a few months ago. I had been researching this article for a few months and had seen quite a few pictures in books and magazines. But I needed to see one in person. Somehow I felt things would click in my head if I could examine up close the thing that I had spent many hours pursuing in libraries and archives, and with many letters to museums here and in Europe.

And when I did I fell in love all over again. They really are things of such graceful beauty. Even in it's old age this instrument radiated a sense of charm and elegance that you may find hard to imagine on something with a foot long horn that would be more at home one of Henry Ford's Model Ts or Edison's phonograph.

94, Albany St., London, N.W.1 is just to the left of the striped pole in the foreground of this photograph. From 1901 until 1942 Stroh violins were made at this address. Notice the name "George Evans & Co. Ltd." painted on the window. Today this building is no longer there having been demolished and replaced by a block of flats.

(Photo credit: London Borough of Camden Leisure Services--Local Studies Department)

This particular example of the Stroh violin did not arrive in the 1990s without suffering some indignities along the way. Among the many extra holes drilled into it's body and horn over the years were a set designed to hold a tube that was used to blow up a balloon in the horn. Attached at the mouth of the horn was a sharp pin that was hinged so that when you pressed the 1929 Lincoln penny that was soldered to the back of it the balloon would pop.

So ... imagine a performer on stage, or maybe a musician out on the street that has gathered a small crowd. He's playing a tune, maybe not that well, when a bright rubber object starts to grow out of the horn of his fiddle. Howls of laughter. And then it suddenly pops at a certain point in the melody right on cue. People turn to each other smiling. How did he do that?

This is the impression that a lot of people have of the Stroh violin – that it's just a gimmick, some wise guy's idea of a novelty musical instrument designed to appeal to the quirkiness in us all.

Or that somehow it was meant to be an improvement on the traditional violin; that if it had appeared twenty years earlier it would have been immortalized in Edward Heron Allen's classic book *Violin-Making: As it was, and is* in the chapter called "The Violin.. it's Vagaries and its Variegators" as a pretender to the throne of Stradivari.

Invented by a prolific and often overlooked inventor and scientist, Augustus Stroh, and introduced in 1901, the Stroh violin became cutting edge technology – the standard of an industry – for over twenty years. The place where the Stroh violin gained a foothold and stayed for such a long time? The recording studio.

THE EARLY DAYS OF THE RECORDING INDUSTRY

When Edison invented the phonograph, some of the uses he envisioned for it were more along practical lines such as being able to record dictation for later retyping. Little did he realize that by the 1890s the sale of recorded discs and cylinders of music would be very popular.

In order for a good recording to be made though, the music had to be played very loudly. This would explain why there were a lot of banjo recordings made in the 1890s. For anyone who's never been to a bluegrass festival, the banjo is a very loud instrument. Therefore it recorded well. I've been told that a lot of singers made at least one record back then, and that the only ones to make more than one record were the singers that could sing loudly.

Obviously, the recording studio of the early 1900s was very different from the recording studio of today. One key thing to understand about the Stroh violin story is the *fundamental* difference between recording techniques before and after 1925.

In 1925 a major development in recording technology occurred, and brought about a new era in that field. This innovation, electrical recording, fundamentally changed the way records were made, and drastically improved the frequency response of recorded discs. It also made the Stroh violin obsolete as a recording tool. Prior to this innovation though, recordings were done in a much different way, and it was under these circumstances that the Stroh violin ruled.

The earlier method has become known as acoustic recording. It is called acoustic because there were no microphones and no electrical amplification of the sound before it was recorded.

Music was played into a horn. These sound waves vibrated the diaphragm at the end of the horn, and a stylus that was attached to the diaphragm cut a groove into the recording medium of soft wax. In a nut shell this was how it was done long before the days of the LP or hi-fi, let alone the CD or DAT machines.

Acoustic recording was not very sensitive and required musicians to crowd together as close as possible to the recording horn, with the louder instruments being just a little further back, in order for a decent recording to be made. One drawback to this early recording method was that a traditional violin did not record well under these circumstances.

All recordings done using the acoustic process – that is, all recordings prior to 1925 – could reproduce frequencies from 350 to 3,000 Hertz only. A performing hand could easily generate frequencies from 30 to 12,000 Hertz. Recording engineers struggled unsuccessfully for many years to reproduce frequencies above 3,000 Hertz.

A large portion of the violin sound occurs in this higher range – that is, above 3000 Hertz. Therefore, most of the higher harmonics that make up the sound of a violin were impossible to record, and what could be recorded was not loud enough to be heard over the other instruments in the band.

What was needed was a louder violin. Augustus Stroh understood this and it was he who presented to the recording world a solution to the problem of capturing the violin sound on wax.

If you were to play a record or cylinder made prior to 1925 of a band with strings, chances are the violin you would hear was not the spruce and maple violin of old, but a mahogany and aluminum instrument that was invented with the intention of improving the *recorded* sound of the violin.

This was the Stroh violin. It replaced the sound box of the traditional violin with an aluminum diaphragm and a large trumpet horn. This mechanically amplified violin was used in the recording industry from its introduction circa 1901 until the mid-twenties when the electrical recording system was invented.

Not only was it a louder instrument, but the player could point the movable horn and direct the sound where it needed to go – that is, into the recording horn. Most pictures that you see of early recording sessions that included strings often show one or more Stroh violins.

The first known use of the Stroh violin on a recording done in the United States was in April of 1904 by the violinist Charles D'Almaine. On that day he recorded four sides for the Victor Co. Sometimes the label of Victor 78's advertised the fact that a Stroh violin was used on the recording.

The art of making an acoustic recording was in the placement of the musicians in relation to the recording horn. The challenge was to get the right balance of sound, and having them close enough to the horn to be audible.

Joe Batten, an English conductor and musician who's recording career began in the days of acoustic recording explains:

"The real perplexity of a recording session was to get singer and instrumentalists as close to the all-too-small horn as possible. The singer had the premier place, but his discomfort was always apparent, with the violins a foot away, the bassoon midway between his mouth and the recording horn, the clarinets perched on high stools eight feet from the ground with the bells of each instrument six inches from his right ear, and the flute standing a foot behind him. Only the cornets and the trombones were kept at a respectable distance, the cornets standing ten feet away, and the trombones, perched on stools like the clarinets, twelve feet away."

— from *Joe Batten's Book*

Recording session at the Edison Recording Studio, 79 5th Avenue, New York City, circa 1907-1910. Singer Harry Anthony (John Young) sings while Eugene Jaudas conducts the orchestra that includes three Stroh violins.
(Photo credit: U.S. Department of the Interior, National Park Service, Edison National Historic Site.)

Before Stroh violins came into use the violin sound would just become lost on recordings in such a large group of instruments. Lest you think that Mr. Stroh's invention was the perfect solution to the problem, note what Fred Gaisberg – whose jaunts through Europe and Asia in the early part of this century recording musicians for Emile Berliner are legendary – had to say:

"There stood the recording machine on a high stand; from this projected a long thin trumpet into which the artist sang. Close by, on a high movable platform, was an upright piano. If there was an orchestral accompaniment, then half-a dozen wind instrumentalists, also on high stands, would be crowded in close to the singer. Perhaps one Stroh violin, its trumpet bearing close on the singer's ear, would be the sole representative of the string section, and he would be left inaudible if he did not exaggerate heavily the pizzicato, glissando and vibrato characteristics of his instrument."

— from *The Music Goes Round* by F.W. Gaisberg.

Alas, the Stroh violin was not accepted with open arms as the answer to all violinists' and sound recordists' dreams. In fact there was disdain for the instrument then that still remains today whenever a violin builder makes anything that varies from the norm.

One newspaper report from 1904 announcing a new recording by the violinist Kubelik actually made the point that he was *not* playing a Stroh violin. Perhaps as a concession to the usefulness of the Stroh violin for recording Kubelik did later use it to record.

HOW THE STROH VIOLIN WORKS

When held in playing position the neck, fingerboard, bridge, and strings of the Stroh violin are in exactly the same position they would be on a regular violin.

The bridge sits on a rocking lever that on some models rides on a knife edge. On other models the rocking lever is held between two adjustable set screws. As a bow is drawn across the strings the lever and bridge are free to oscillate and these vibrations are transmitted from the end of the lever through a small connecting rod to the center of the aluminum diaphragm.

The conically shaped diaphragm is held in a cast aluminum housing that is screwed to the cylindrically shaped wooden body of the violin. The housing is open on the side on which the connecting rod attaches to the diaphragm, and is closed on the other side except for an opening in the center that the big horn attaches to.

The horn, or "trumpet-shaped resonator or tube," as the UK patent for the Stroh violin states, is there "to augment or distribute the sounds emitted by the diaphragm." Without the horn the Stroh violin would not be as loud as it is. To understand this think of the difference between a normal-sounding voice and what a person talking through a megaphone would sound like.

On some models there is a smaller monitor horn that attaches to the housing on the same side as the big horn. It points back at the player's ear and makes it a little easier for him to hear the instrument.

WHAT DOES A STROH VIOLIN SOUND LIKE?

In a word, like a violin. Even veteran collectors of acoustic era discs and cylinders cannot tell by listening whether it is a Stroh violin or not being played on a particular recording. It is generally accepted that most acoustic recordings that included violins were done with Strohs and that it was the Stroh violin that made it possible for the violin to be audible.

To be honest, the only Stroh violin that I've heard in person had some problems with the diaphragm bottoming out on the housing and muting its tone, but it too sounded like a violin. It was just not as loud as it should lave been.

I do have a tape of the late Irish fiddle player Julia Clifford playing her Stroh violin. Listing to this recording, done in the late 1980s, there would be no way of knowing that it was a Stroh she played, unless you were told so.

TWO AUGUSTUS STROHS?

Who invented the Stroh violin? This question needs to be asked because there is some confusion between the roles played by the two Strohs, father and son, central to the story of the Stroh violin.

Augustus Stroh was the *inventor* of this instrument. His son Charles Stroh was the first *manufacturer* of the Stroh violin. Charles is often erroneously credited with its invention.

Augustus' full name was John Matthias Augustus Stroh. Sometimes he is referred to as J.M.A. Stroh, and sometimes as A. Stroh, but for the most part he is known as Augustus Stroh.

Charles' full name was Augustus Charles Stroh. Perhaps since his father went *by* Augustus, he went by Charles. Sometimes you see him referred to as Charles Augustus Stroh. But Augustus Charles Stroh is the name on his birth certificate.

To avoid confusion I will refer to John Matthias Augustus Stroh, the father, as Augustus and to his son as Charles.

J.M.A. STROH

Augustus was seventy three years old when the final patent for the Stroh violin was issued in 1901. He was born in Frankfurt-on-Main in 1828. He originally went to London on holiday in 1851 to visit The Great Exhibition.

Held at the newly built Crystal Palace, The Great Exhibition was intended to showcase the marvels of the then-emerging industrial world, and was organized and presided over by the Prince Consort Albert, a fellow German. Impressed by England and its scientific institutions, the young Stroh decided to settle there, eventually becoming a British subject in 1869.

Apprenticed as a watchmaker in Germany, he set up shop in London at 2, Carlisle St., Soho Square, from 1857-61. In order to pass the exam for his apprenticeship in Germany, the young Stroh was required to construct a special form of vertical clock escapement. So well did he do at this, that the examiners allowed him to keep the instrument when completed – an unprecedented concession. His interest in horology, the art of constructing instruments for indicating time, remained, for he was issued a patent in 1869 for an electric clock escapement.

SIR CHARLES WHEATSTONE

From 1858 he worked closely with Sir Charles Wheatstone. Wheatstone is best known as the inventor of the concertina, and stereoscopy, as well as for making many improvements to the telegraph.

Music being one of the things that these two men had in common, they were issued a joint patent in 1872 for an accordion-style instrument that could slide between notes. Years later, while eulogizing Augustus Stroh at the Institution of Electrical Engineers, Mr. W.M. Mordey remarked: " He was associated with Wheatstone in the invention of what is called the English concertina – an instrument that I believe musical people consider is really a musical instrument." In fact, Wheatstone had invented the concertina years before he met Stroh.

It is told that Stroh made a watch and presented it to

Wheatstone that had the dimensions of an English half crown, both in diameter and thickness. A half crown is slightly larger than a fifty cent piece.

In 1860 Stroh and Wheatstone set up a shop together at 29, Tolmers Square, Hampstead Road, London, to manufacture the telegraphic equipment that they designed together. It is generally agreed that while Wheatstone got the credit for such inventions as the ABC telegraph, and the Wheatstone automatic high-speed telegraph – machines that were on the cutting edge of communications at that time – he could not have done it without Augustus Stroh's great mechanical skill.

In fact, Stroh was awarded a Gold Medal by the International Jury of the Paris Exhibition of 1878 for the high-speed telegraph. It is not unusual to read reports from that time that heap great praise on Stroh: " the prince of mechanicians" , " the greatest mechanic of the day", "Clever Mr. Stroh" , " one of our ablest mechanicians" .

After Wheatstone's death in 1875, Stroh maintained the Tolmers Square factory for a while, then sold it to the General Post Office in 1880. Contrary to what has been reported elsewhere, Augustus Stroh was never an employee of the GPO. He was, however, associated for a time in the late 1870s with Sir W.H. Preece, Assistant Engineer and Electrician of the GPO.

THE PHONOGRAPH

Late in 1877 Thomas Edison announced his latest invention to the world – the tinfoil phonograph. An Englishman named Henry Edmunds who was in America at the time visited Edison's workshop, and witnessed a demonstration of this new device. Upon returning to England in the New Year, Edmunds told this story to *The Times*, and an article about the phonograph appeared on January 18, 1878. After reading this, Preece retained Edmunds to consult with Stroh to make a phonograph.

Augustus Stroh built the first phonograph to be made in England, and this machine was shown at the February 1st, 1878 meeting of the Royal Institution. This was a replica of Edison's first phonograph, with the addition of a heavy hand crank that acted like a flywheel to even out the speed of rotation.

By February 27th, Stroh had built an improved version of the phonograph, adding a fan governor, and a clockwork motor. This machine was demonstrated on that date at the Society of Telegraph Engineers by Preece and Stroh, and was noted to produce a quality of sound much better than the hand cranked phonograph.

This very machine, later modified by Stroh to record on wax or tinfoil over wax – as opposed to tinfoil alone – is today the subject of research to determine if the recording on its mandrel is indeed the oldest existing sound recording in the world, as reported by the 1994 edition of the *Guinness Book of World Records*. It is owned *by* a Southern California collector.

The first company to manufacture the tinfoil phonograph in England was the London Stereoscopic Company. It is generally believed that the phonographs sold *by* the London Stereoscopic Company were designed by Augustus Stroh.

SYNTHETIC VOWELS

Around this same time Stroh and Preece were also investigating the synthetic production of vowel sounds. Machines were built and demonstrated at the Royal Society in London.

An article that appeared in February of 1879 entitled "Studies in Acoustics. I. On the Synthetic Examination of Vowel Sounds" was later referred to in the 1885 English edition of the monumental work by Hermann Helmholtz *On the Sensations of Tone*. Alexander J. Ellis, English translator of Helmholtz, describes how he was given a personal demonstration of the apparatus used in this experiment by Augustus Stroh himself.

One of the machines used in these experiments consisted of a pen attached to a series of levers and wheels that mechanically produced a complex sine wave and drew it on a piece of paper. Somehow Stroh and Preece were able to transfer these synthetically produced waves into the groove on the edge of a small brass disc that could later be played through a needle and diaphragm producing vowel sounds. Anyone who seeks out

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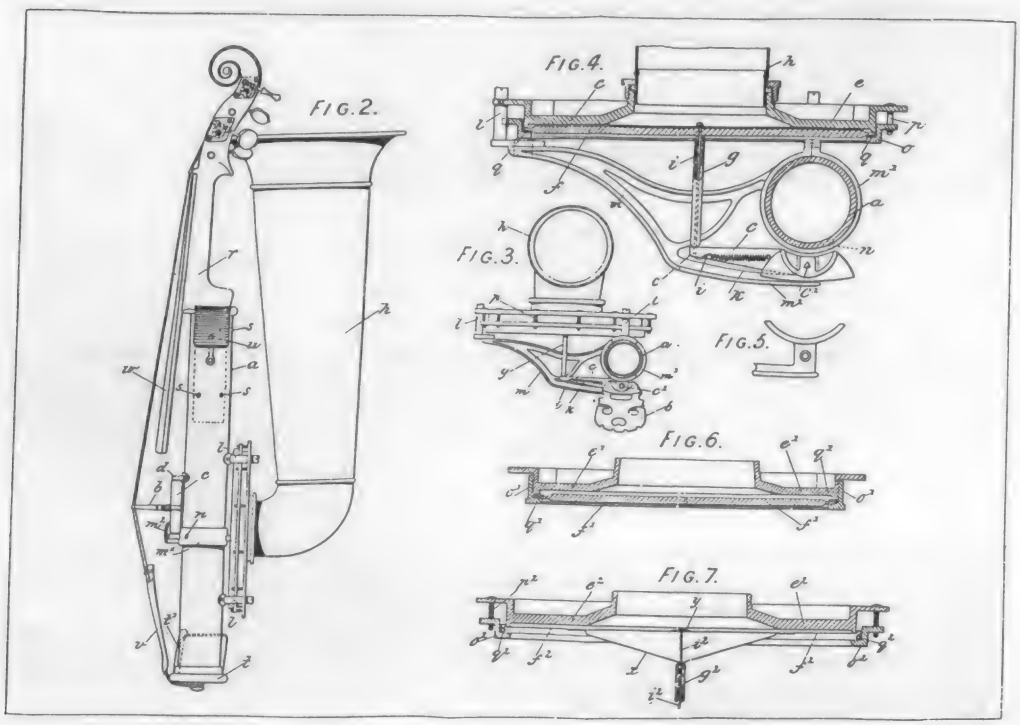
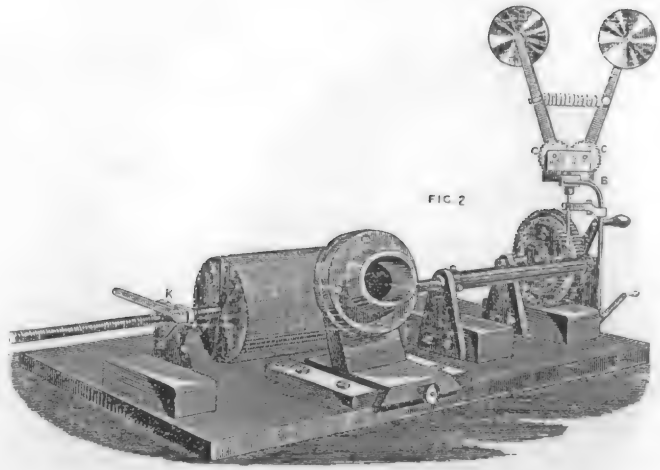
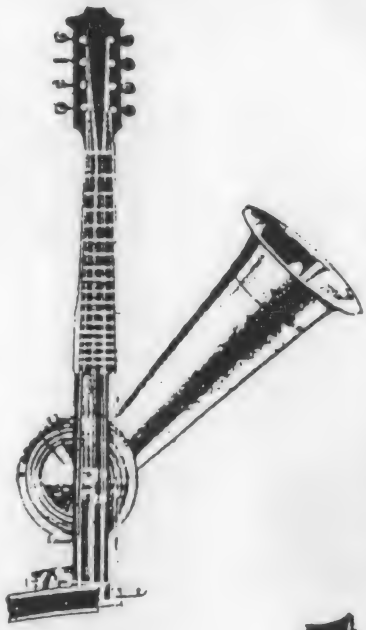
UPPER PHOTO: "The Late Mr. Augustus Stroh" (Photo credit: Self portrait from Engineering: An Illustrated Weekly Journal)
MIDDLE PHOTO: "Mr. Charles Stroh." (Photo credit: from The Talking Machine Review No. 35, August 1975)
LOWER PHOTO: "The Stroh Violin Being Played." This photograph appeared with The Stroh Violin article in **The Strand** Magazine In 1902. I have a hunch that this photograph was taken by Augustus Stroh himself and that the model is one of his daughters. Perhaps it is Amelia. Louisa Stroh who would have been in her early thirties when this picture was taken.

ABOVE: "The 'Stroh' String Bass"
(Credit: Melody Maker. Reproduced in the Guinness Book of Jazz.)

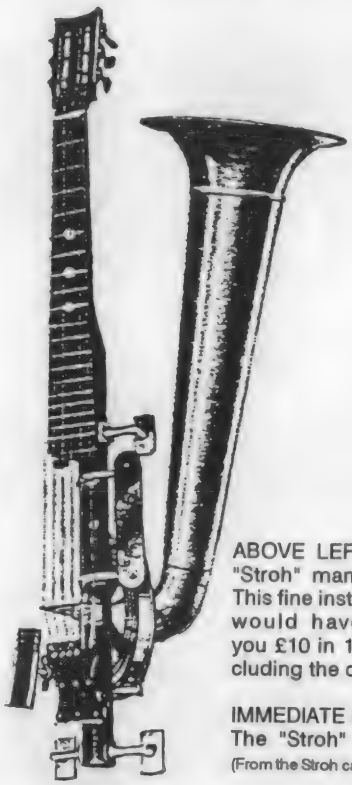
BELOW: Detail from the British patent for the Stroh violin. A good source for copies of British patents going back hundreds of years is, believe it or not, the Los Angeles Public Library.







ABOVE: Augustus Stroh Tinfoil Phonograph. This is a drawing of the machine demonstrated at the Society of Telegraph Engineers by Preece and Stroh on February 27, 1878. It became the model for the tinfoil phonographs sold by the London Stereoscopic Company starting a few months later. It was later modified by Stroh to record on wax or tinfoil over wax, nobody is sure which or when it was done. It is currently owned by Mr. John Woodward of California who seeks any information at all about its history because the recording on the mandrel of this machine could be the oldest existing sound recording in the world.
(Drawing from Engineering: An Illustrated Weekly Journal)



ABOVE LEFT: The "Stroh" mandoline. This fine instrument would have cost you £10 in 1929 including the case.

IMMEDIATE LEFT: The "Stroh" guitar.
(From the Stroh catalogue)

the above-mentioned article and examines the drawings of these machines cannot help but feel the mechanical genius of Augustus Stroh who designed and built the apparatus for these experiments.

RETIREMENT

After selling the premises at Tolmers Square, Stroh retired from business to pursue his many other interests. He then spent many hours in his home workshop at 98, Hayerstock Hill, London, N.W.

One of the many interests that he pursued was photography. He built his own cameras and was able to produce color photographs. The photograph shown entitled "The Late Mr. Augustus Stroh" is in fact a self portrait.

Stroh's interest in sound recording did not end at this point. It's known that he continued his development of the phonograph, building and improving many machines up until at least 1903. This work eventually led to the invention of the violin that bears his name.

CHARLES STROH

John Matthias Augustus Stroh married Miss Emma King on June 16th, 1860 in the parish of St. James, Westminster in London. At the time, he was a 32 year old watchmaker with a shop in Soho Square. Emma, the daughter of a bookseller, was 30 years old. Their first child, a girl, was born two years later in the summer of 1862. She was also named Emma. Three other children followed in the next five years. Julia was born in 1863. The only son, Augustus Charles, was born in 1864, and was named after his father and his maternal grandfather, Charles King. The youngest, Amelia Loiusa, was born in 1867.

Son of the inventor of the Stroh violin, Charles Stroh was its first manufacturer, and, as mentioned above, is often mistakenly credited with its invention. As a youth he assisted with his father's tinfoil phonograph experiments.

He was apprenticed as a telegraph engineer at the Government Telegraph Works in London at the age of 16, and then decided to seek his fortune in Australia. Perhaps he was motivated to leave England by a desire to get out from under the shadow of his by then well-known father. He lived in Australia for fifteen years, returning to England around the turn of the century, just in time to become the first maker of the Stroh violin.

PRODUCTION BEGINS

Augustus Stroh's knowledge of the state of the art in sound recording at the time allowed him to see the need for the development of a recording violin. He received UK patent 9418 in 1899 for the basic violin and then two years later received patent 3393/1901 for the conical diaphragm that was used in the violin when it went into production. US patent no. 644,695, for the Stroh violin was issued to J.M.A. Stroh on March 6th, 1900.

At the time Augustus was over seventy years old and probably had little interest in undertaking a new business venture. It seems natural that his son, just returned from a spell overseas and in need of work, would be the one to take this on.

Charles opened a shop at 94, Albany St. in London circa 1901 to make the violin. Production of the Stroh violin and, in later years, other Stroh-style instruments remained at this address until 1942. One popular Stroh instrument was the phonofiddle. This was a one-stringed 'cello, sometimes called a jap fiddle, that was used by musicians that performed in Music Halls or in vaudeville.

Albany St. runs north-south on the east side of Regents Park. Number 94 was across from Chester Gate. Unfortunately the building has since been demolished and replaced by a block of flats.

By 1906 however, Charles had become a director of the Russell Hunting Record Co. Russell Hunting was a recording artist at that time who was famous for the Michael Casey monologue records. These were humorous routines in which Mr. Hunting did all the voices. Charles had become a fan of his while living in Australia, and little realize that he would one day work with him.

It was announced in 1906 by the *Phono Trader and Recorder* that Russell Hunting had "acquired and taken over the whole business in relation to the manufacture" of the Stroh violin. In December of 1908 however, the Russell Hunting Record Company went out of business. From this point on it is unclear what Charles Stroh's role in the manufacture of his father's invention was. In 1909, advertisements appeared in the London trade paper "Talking Machine News" announcing that the "sole maker" of the Stroh violin was now a Mr. George Evans, successor to Charles Stroh.

GEORGE EVANS

George Evans and Company took over production of the Stroh violin in 1909. Under his leadership the company expanded its line of instruments from the violin and phonofiddle to include the guitar, banjo, mandolin, ukulele, and upright bass – all of these with diaphragm and horn! I believe that it was after 1909 that the trademark "Stroviol" began to be used. It appears that instruments made prior to this date do not have the Stroviol decal that was later put on the slim body between the bridge and the end of the fingerboard.

It was noted above that in the mid-1920s recording technology fundamentally changed. The new method of recording used microphones and vacuum tube amplifiers and was much more sensitive than the previously used acoustic method.

The sole reason for the Stroh violin's prominence in the recording studio up to this point was its loudness. With the new recording technology it was no longer necessary for musicians to crowd close to the recording horn. Now a microphone could be set up in the middle of the room to pick up the sound and the band could spread out a little and play more comfortably.

The Stroh violin, after more than twenty years of use in the recording studio, and after being used on practically every record with strings made during that era, was now obsolete. But only obsolete for studio work. Recording studios now sold all of their Stroh violins to antique stores or consigned them to cold storage in the basement.

POST-ACOUSTIC ERA

The Stroh violin went out of use for recording in 1925 but continued to be made until 1942. All along it had been used for live performance, but from 1925 until 1942 this would have been the only demand for it. Certainly there was an advantage to having a louder instrument for performing, especially in the days before good public address systems.

"THE GREATER volume of tone produced by the "Stroh" instruments makes them especially suitable for the small orchestras found in kinemas, dance rooms, restaurants, etc. Very often the exigencies of space make it imperative that the orchestra be kept small. The exchange of one, two or three instruments of the ordinary kind for others of the genuine "Stroh" pattern will give the effect of an orchestra more than trebled in size." — from the Stroh catalog circa 1927. [Spelling for "kinema" is from the original.]

By the early forties, though, the violin no longer held the same position in popular music that it had in earlier times. Julian Pilling touches on this topic in his brilliant article "Fiddles with Horns" published in the *Galpin Society Journal* in 1975. At the same time the electric guitar was starting to be played more and more in orchestras, and so after 40 years of production the Stroh violin, and its younger siblings the Stroh guitar, mandolin, etc., ceased to be made.

A QUESTION TO PONDER

Both Smith and Brozman, in their respective books on Rickenbacher guitars and National resonator instruments, mention that George Beauchamp had seen a violin with a horn used in vaudeville and wanted to have a guitar made with a resonator that was louder than the usual instrument. More than likely this was a Stroh violin that he saw. Apparently unaware that Stroviol also made a horned guitar, Beauchamp sought out John Dopyera in the mid to late 1920's to have him build a resonator guitar. Thus began what was later to become National and Dobro. Could it be said that in an indirect way, Augustus Stroh and his violin was an influence on the development of the resonator guitars made by National and Dobro?

A LEGEND DIES

John Matthias Augustus Stroh died on November 2nd, 1914. He is buried in London's Hampstead Cemetery in a family grave with his wife Emma, their daughter Emma, his mother-in-law Margaret King and his sister-in-law Louisa King.

His life coincided with what is sometimes called the Age of Progress, an era that began in all of its innocence with the Great Exhibition in 1851 and ended in 1914 with Europe plunging into the depths of war. Stroh was a product of this time of great advances in science and industry and his contributions, often unrecognized, were none the less great.

Stroh reaped the benefits of his contributions though. At the time of his death his estate was valued at more than £93,000 – quite a considerable sum for 1914. But for all of his work with the telegraph and the phonograph, his best known legacy is still the one that bears his name: The Stroh violin.

UPPER PHOTO: Scott Skinner's Stroh violin with leather case. The Strathspey King recorded with this instrument in the early years of the 20th century. This instrument has no 'Stroviol' decal, no monitor horn and has the knife edge style bridge lever.
(Reproduced by permission of North East of Scotland Museums Service, Peterhead, Scotland.)

SECOND FROM TOP: This trio of beauties was found on a trip through Burma by Dennis Griffin. The instrument on the left has an unusual cover plate on the diaphragm housing with the initials U.B.C. stamped into it. The same initials are also stamped on the diaphragm. It also has tuning gears on a plate. The violin on the right has a very thick neck scroll and metal friction pegs as well as an unusual monitor horn. Both have the distinctive seamed large horn that is very typical on Stroh instruments but don't have the usual 'Made in England' stamped on the inside of the shoulder rest. The violin in the middle has a spun horn and is either a cheaper model made at the Stroh factory or is a German copy of the Stroh. More on Stroh copies in a future issue of EMI. (Photo courtesy of Dennis Griffin)

THIRD FROM TOP: Here's a view of the Stroh violin that you don't see too often. The small hole in the housing next to where the horn mounts is for the smaller monitor horn which is missing on this violin. This instrument belongs to Al Dodge.
(Photo by Cary Clements)

BOTTOM: Close-up view of the bridge, rocking lever, connecting rod and the aluminum diaphragm of the Stroh violin. Notice the knife edge on the bottom of the lever. It rides in the groove in the curved plate that is screwed to the circular body of the instrument.
(Photo by Cary Clements)

ABOUT THE STROH VIOLIN PHOTO ON THE FRONT PAGE OF THIS ISSUE

This pristine example of a Stroh violin is from the Shrine to Music Museum in Vermillion, South Dakota. Notice the 'Stroviol' trademark decal on the body between the bridge and fingerboard and the small monitor horn protruding from the back of the diaphragm housing. This instrument has a bridge lever that is supported between two set screws.
(Photo credit: The Shrine to Music Museum, University of South Dakota)

Cary Clements is a long time EMI subscriber who lives in San Francisco, currently works in the harpsichord field, used to work in the abalone grinding and electric violin fields, and here takes his first steps into the writing field. Between building guitars and electric fiddles he plans to continue research into the Stroh violin and Augustus Stroh. You can write to him at 2417 Bryant St. San Francisco, CA 94110 or through EMI.

For generous assistance in the making of this article, special thanks to: Al Dodge, John Woodward, Craig Ventresco, Dave Radlauer, Bob Greenburg, Dennis Griffin, Dr. Margaret Downie Banks, and Jim Marsh.

IMPORTANT NOTE

Due to space limitations in this issue, we have delayed several appendices to this article and will print them in the coming issue. They include an extensive bibliography on Stroh violins, a listing of patents held by Augustus Stroh, and a listing of museums having Stroh violins in their collections.

Also to come: The Stroh Violin inspired many imitators, and many of the surviving instruments one encounters today were produced not by the Stroh company, but by copycat manufacturers. Author Cary Clements is continuing his investigations in this area. You can look forward to a follow-up article on the subject from him in a future issue of **Experimental Musical Instruments.**

EDISON NATIONAL HISTORIC SITE PRESENTS

EDISON DAY,

SATURDAY MAY 20, 1995

Featuring a recording session with a Stroh violin and an 1890s Edison Spring Motor Wax Cylinder Phonograph. Christopher Lee, Concert Master with the New Jersey Symphony Orchestra, will record playing the Stroh with piano accompaniment.

At National Park Service, Edison National Historic Site, Main Street and Lakeside Avenue, West Orange, NJ 07052.

For more information and times call: (201) 736-0550

"Mr. Hats McKay on THE 'STROH' HAWAIIAN or STEEL GUITAR." In the late 1920s the Stroh guitar cost £15. An example of this instrument is in the collection of the Roy Acuff Museum at Opryland, USA in Nashville, Tennessee. Neither it or the Stroh violin seem to have had much of and impact on country music.

(Photo credit: Shrine to Music Museum, University of South Dakota)

CALL FOR THE HIDDEN SOUNDS

by Johannes Bergmark

Original text written in Swedish for **Mannen På Gatan 2 – Surrealism 1994**, Surrealistförlaget, Stockholm 1994. Enlarged and translated for **Experimental Musical Instruments**.

1. BIRTH OF MUSIC MAGIC.

Sound is movements of matter. Matter in stillness has a quality that I will label as *sound potential energy*, like a rock which can start falling at any time from a mountain top if you push it. Music is mediation of movements between *human bodies*, through pulses in the air (sometimes with a middle link of location energy – recording; sometimes only the musician's own body in loneliness communicating with itself through the media). It is always an *indirect* mediation of the body movements: the body is never self-sufficient, not even when you are dancing or singing. The body, moreover, is *spiritualized*, researching its relation to the spirit, excited by the vibrations. All the joints involve spiritual attitudes, sexual and sublimized desires, back to the own body of the musician, to the amount of air to the meeting (listening) bodies (and their thinking), to the bodies themselves in potential movement and to all the matter that leads the movement away from all bodies in endless dilution. To the degree that the music is opened for a total investigation and bewildering of all the joints, or if it is overmastering in a direction beyond the everyday, it can have magical potential – it can reveal important hidden forces. Certain dominating attitudes to matter and people, however, limit this magical potential and form conventions that define what is (communicates as) music and what is (does) not.

Johannes Bergmark's STRINGED STIRRUPS, described on page 20.

A deepening of the understanding of the movements of matter and its meanings to the movements of the body starts with an inventory of the collected potential energies that lie hidden in and around the body: a concentration in stillness and silence. At the first scratch, bang or hiss (sometimes even a movement in silence) a focusing takes place, the point of departure for a movement of movements. Through this meta-movement, desire – this huge collection of abstract potential energies – is given possibilities to transform itself into concrete but transient pulses through matter. These pulses recreate new movements through the bodies but are at the same time apprehended as independent objects that last longer than the actual sounds by their being incorporated into imagination. Such sound-referring objects of movement are identifiable in the same way as words and visual forms, and even though these domains are kept apart by senses and concept, they are born in a corresponding way and can have respectively parallel inner laws and structures. Here, a spiritual concretization takes place, which is soon surrounded by memories, prejudices, conventions. The reproduction, the mediation, of the pulse of movement becomes followed and affected by the parallel *spiritual* pulse, and their structures mirror each other. The inner relation that you perceive between musical objects indirectly mirrors the conception you have about the objects in the thinking.

Here is thus a corresponding parallel fork in the road of attitude: the pulse of movement can be halted or directed into systems that aim at maintaining or establishing a certain material or ideological structure. Another way is, by means of active interest for, or passive curiosity on, the unknown possibilities of development of the pulse, to open doors, to draw threads, to attach resonators, to lead the spark over to other rooms. But also to actively break off and shock it in order to discover patterns of surprises. This play without evident goals does not necessarily have anything to do with knowledge, skillfulness, message or art. It is a native life instinct, the one that from the very beginning made us discover everything. The person trying this road will see that it, as time goes by, is neither structureless nor arbitrary. The structures are a potential inherent in the details, and if this is developed freely, structures are created by themselves. They can even create traditions – yes, all traditions are created that way.

The given music and the given instruments around us are only one road, and a very winding one. To choose this *without* regularly returning to an inventory of the bodily potential energies – desire – is a failure, a tragic forgery. The illusion of stage art, to manage, to rapidly conquer a social role, distorts the picture of the *real* possibilities, *even* the social ones. The free development of play to make life more beautiful and give us deeper knowledge about the material bodies, presupposes a total despair of or suspicion of all *means*, above all those (art, stage ...) that are connected to promising the kind of place of the ego in the world, where it is given a touch of fame immortality, immobility, self-sufficiency, non-curiosity, symbolism, giving-up, conservatism, stupefaction.

But the stage, and all other means, must *also* be able to be used as fields of experiment to refine the *sensibility*. This sensibility for musical (poetic) potential energy, though, is not necessarily expressive. Communication doesn't have to start from stage, it could have as its point of departure the kidneys of the audience as well as the cold air outside. No one has basically anything more to express than anyone else. But the sensibility demands training, renewed training.

2. BIRTH OF MEANS.

My interest for music was liberated by quitting my piano lessons. I was mostly curious about "incomprehensible" music, but came to believe that I was in conflict with my political commitment. The conflict was clarified for me by surrealism, i.e. creation as a result of all the psychic levels in accordance instead of only consciousness or tradition. Ideas of complexity, pedagogy or message, I rejected in favor of poetic freedom. I indulged in free improvisation and Cecil Taylor became my "master." Many experiments and much searching was made in the Stockholm Surrealist Group, of which I am still one of the members, when it formed in 1985. We played on anything in spite of "previous knowledge." The focusing of the playing was gradually increased. I discovered an until-then-unknown power in my body, independent of my consciousness, capable of guiding the course of events independently and creating its own structures. The formal freedom then, was not anymore such a central point, but instead the invocation of, the listening to this corporeal demon individually as well as in collective playing. I understood that there must be a correspondence to this in dance, and my childhood passion for acrobatics and climbing got a new significance through this return. (Later, I found a surprising connecting link , though not a full equivalent, to the Japan-born *Butoh* dance movement.)

The Chicago (nowadays Cedarburg, WI) surrealist Hal Rammel introduced me to the playing of the musical saw and instrument invention as well. I made experimental tunings of my piano, first at random (inspired by a text by August Strindberg), then "wave-tuned," non-even-to-the-octave (narrower in the middle). I got the Australian drone wind instrument (with circular breathing) *didjeridoo* and the Bengal one-string *gopychand*, both very expressive and rich in spite of their simplicity.[1] With my first instrument, the piano, I was lacking this simple inner understanding, which led me to the only vocational education I have ever started voluntarily: the piano technicians' class. In the workshops at the school, I started to build instruments.

Those who have once tasted the powerful nucleus of improvisation cannot return as the same person; I think this is also the case with instrument invention, which is the same kind of search for the naturally hidden sound in the body, or in objects of all kinds, without separating the "practical" object from the "aesthetic" one. German anthropologist Hans Peter Duerr, e.g., writes in "Sedna oder die Liebe zum Leben" (1985): "Generally, the music bow of the bushmen, which also appears among the negroes of Africa [...] is identical with the hunting bow [...], but that doesn't necessarily have to mean that the bow was *first* used as a hunting tool and then as a musical instrument. What if the relation was opposite!" My reaction was: "what if the musical saw came before the tool saw?" ... Then, after having read about one who united "practical" and "aesthetic", and his instrument inventions (Emanuel Winternitz: *Leonardo da Vinci as a Musician* 1982), I got two dreams:

I saw a one-string instrument (similar to the gopychand but with no neck) where the resonator is held and kept in tension with one foot in the air (you stand on only one foot) and the other end of the string is fastened and kept in tension with a thong around your neck. You play it with a bow.[2]

I wanted to realize this, and found a butter box which would serve as a resonator, and made a double, crossing loop of thick piano wire through the bottom, that would serve as a bridge by the string going through it.[3] The instrument's name became *butter bass*. It turned out to be very rich in overtones: it can embrace a large timbre field, although it doesn't make it easy to play conventional "melodies." As the tension of the string can be varied very quickly, the instrument's sound can jump between earthquake-like percussive roar, lyrical chirping of flageolets which are achieved with the light touch of the free hand[4], and a gigantic train brake when the bow plays strongly close to the end of the string. That's more than usually expected from a single string! To realize the strange one-legged playing position from the dream, I thought about placing a stirrup at the far end of the butter box, but the stirrup idea would only return later in another instrument. The butter bass became a seated position instrument, with both feet against box and floor.

In the other dream there was a drum with a metal tongue fastened on the skin. The tongue would be played with a bow and, according to the dream, change pitch as the skin was pressed.[5] The dream is acoustically not logical, as the drum skin would be a resonator and not alter the pitch of the tongue. I haven't built this instrument according to the dream either – but it has made me aware of the easily accessible possibilities to sound variation that all thin, stiff and slim objects like knives, ice cream sticks etc., have, when held against the edge of a resonator (e.g. a table or a drum) and played on their overhanging part with a bow. Here too there is a surprising range of variation from creaking, whistling, squeaking and humming, depending on length and material and on the speed, pressure and placement of the bow. The ice cream sticks can be surprisingly similar to the human voice's complaining, singing, sighing or wondering sounds.[6]

I also made a special silver-plated tool, called *silver rod,* to make the maneuvering easier. It turned out to be too squeaky but it could produce an interesting ghostly vibrato through its bigger size and weight. Later, when I cut the end in half, I got rid of much of the noise, and renamed it *forked silver tongue.*

The *hedgehog* is a more successful variation in wood. It has a garland of wooden sticks as well, protruding at a small angle upwards on the finger holder, and giving a fine whistle or squeak from the bow.

Dreaming and chance, and the surprisingly useful turning-points that "failures" provide, were points of departure for creation, and lack of "ideas," knowledge and materials haven't been any decisive obstacles. Instruments that at first seemed to be "failures" in relation to my expectations, soon "taught" me what their point was and how they wanted to be played. That

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1. The didjeridoo is a piece of a branch hollowed out by termites, adjusted in the mouthpiece and painted. The gopychand (also called **ektara**) has one string ending on a tuning pin where the legs meet in the top of a forked neck, with the other end in the middle of a drum skin. As you squeeze the neck, the pitch goes down. Players in Bengal pluck it as they sing. I usually play it with a bow.

2. This instrument, though of the same size as the gopychand and with the same name, actually exists in Bengal, I later discovered! They hold the resonator under the arm and pluck it with a plectrum.

3. This inverse bridge also exists in the musical bow **berimbau**.

4. A playing technique that was also used on the **tromba marina**.

5. Like the **baya**, the lower of the Indian drum pair **tablas.** As an instrument, it would be related to other friction drums as the **cuica** or **rommel pot**.

6. I am not alone in this discovery: since it was made, I have seen Swedish/German percussionist, accordionist and poet Sven-Åke Johansson do similar things, and the German Hans Reichel has earlier developed the idea into his **daxophon**. Many percussionists also use a bow on cymbals, vibraphone or bells. The saw, the most distinguished of bowed idiophones, was already known to me.

INSTRUMENTS OF
JOHANNES BERMARK

Upper left:
Butter Bass

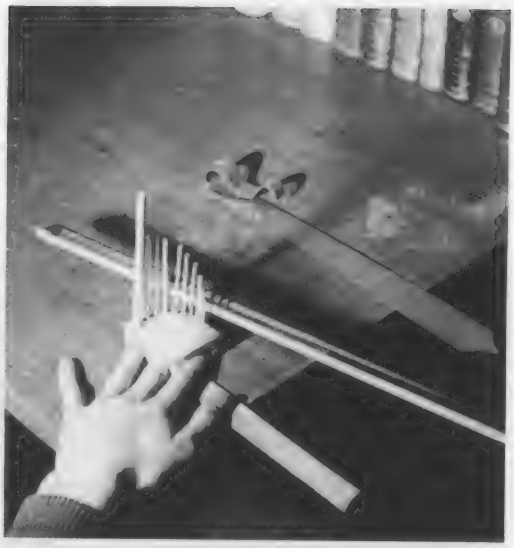
Upper right:
Hedgehog & Silver Rod

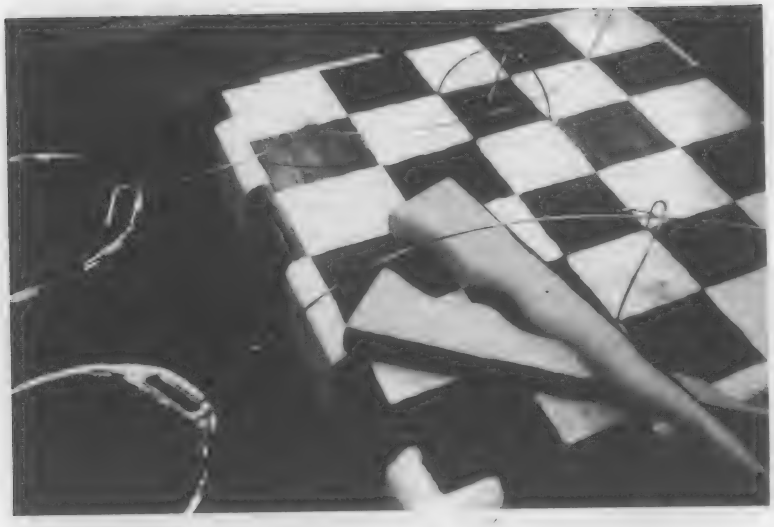
Center left:
Clay Didjeridoo

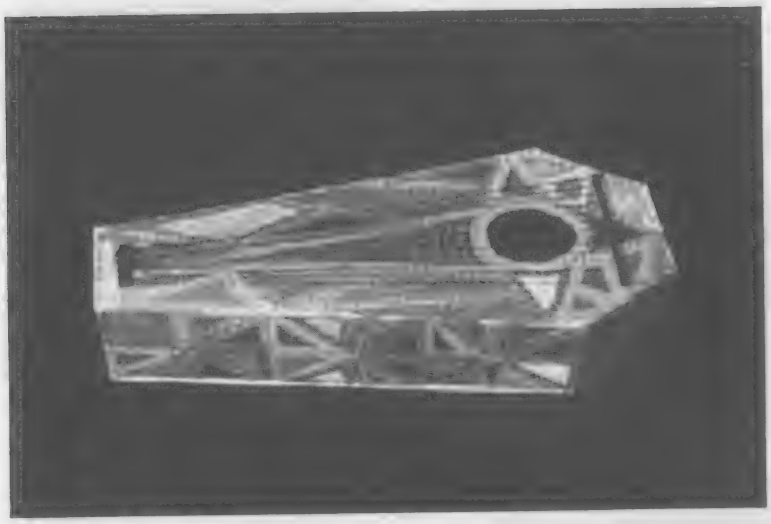
Center right:
Metal Harp

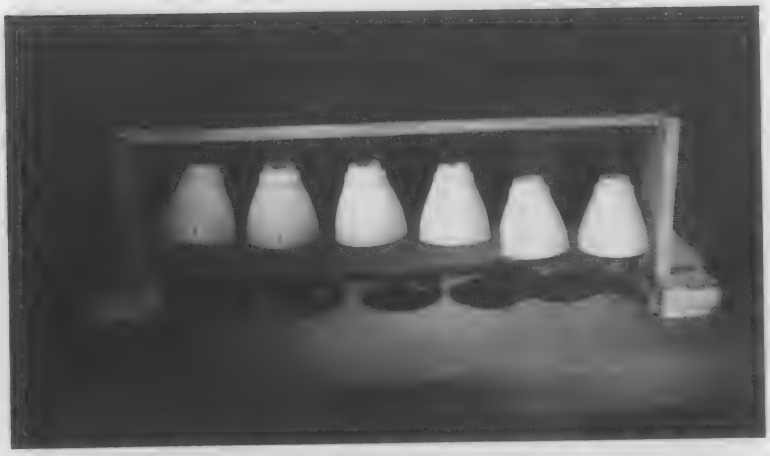
Lower left:
Maiden Crown

Lower right (two photos):
Double Trumpet









Upper left: Stringed Stirrups with beaters.

Upper right: Concert with Stringed Stirrups from the Opera terrace in Stockholm. (photo: Camilla Johansson).

Center left: Stringed Coffin (after dream of Petra Mandal, model made by her).

Center right: Finger Violin.

Lower left: Glass Shade Bells.

Lower right: Veloncell Marcel.

attitude I also try to have in relation to traditional instruments that I "can't play." I have also to taken all the chances to make traditional instruments: 5-string kantele (ancient Finnish/Baltic string instrument), Swedish bagpipe, clavichord (two different ones), lur (Nordic wooden harmonic trumpet), Hardanger fiddle (Norwegian folk variation on the violin and viola d'amore, with sympathetic strings) and renaissance recorder, and I also made a didjeridoo of clay, curved like an alto saxophone.

Rammel's circular bowed instruments[7] and the saw gave me the idea for the *metal harp,* with triangular sheetings welded around a copper tube, which besides being played with a bow, also can be used as a trumpet, flute or percussion instrument. The bright timbre of the plates shimmers extra when you spin the instrument in your lap.

The *maiden crown,* circular as well and made of clay, I built when I discovered the beautiful ring as I used a bow on a protruding edge of the clay didjeridoo. It consists of a turned bowl whose edge I have cut up into nibs of different lengths, and on every nib turned out a sharp edge for bowing. It has turned out to function better as a percussion instrument, though.

I also wanted to make a didjeridoo with the possibility of playing polyphonic and melodic music. The *double trumpet* is a result; it works, but not as it was meant to (with circular breathing). However, it does have some advantages besides looking funny.[8]

When I heard that every string in the piano is under tension corresponding to about 70 kilos, I imagined a man hanging in every string, and that was not very far from actually mounting a model in the ceiling of the workshop, with stirrups in the lower end of two strings. A stool was made into a resonator, with the same kind of loop bridges as on the butter bass (two of them) through the seat. To hold the vertical resonator up and in tension, standing in these *stringed stirrups,* I first tried fastening my belt around the resonator and the chest and leaning backwards. The firmness of this belt was overrated, but the inglorious fall into the floor was documented on tape and has given me many good laughs afterwards. Later, I found out a way of fastening a strap around resonator and shoulders without everything gliding downwards into a cluster. Playing became comfortable and liberated both hands and four sounding string lengths for bowing, and beating with specially made felt- and skin-covered blocks. With a contact microphone, the floating, long-ringing, thundering bass tones and intense, whistling overtones come out clearly. Vibrato and pitch change can be achieved by displacing the weight between the feet. From the Opera terrace in Stockholm I also developed longitudinal vibrations — the hanging length was over seven meters! These shockingly strong tones were made by rubbing along the strings with rosined pieces of cloth.[9] The thickness of the piano wires are 1.5 and 1.0 mm, which makes a pitch difference of a fifth if the tensions and lengths are equal. For safety, I climb and play the instrument with protective goggles, which might be unnecessary, but the astronaut- or frogman-like appearance at a performance I think is rather desirable. The spotlight ladder I mounted the instrument in at Unga Atalante in Göteborg (Gothenburg) formed a triangular room which related me back to childhood obsessions: vehicles, outer space, climbing, circus, diving, aquarium.

In two dreams I actually also have returned to the water with music: in one I took a bath and played on the bathtub and the water in a duo with saxophone player Evan Parker; in the other I sat on the bottom of the sea and played the saw. The marvelous deep and long sound that this produced naturally inspired me to make experiments awake, in bathtub and pool, with specially constructed water-resistant bows (and after persuading the suspicious bath attendants). I saw before me concerts in swimming-baths for a snorkeled audience, and in dolphin pools with underwater windows — what would whales think about saw music, which can be so similar to their own singing (and what do they think about underwater musicians)? But the ring was difficult to produce and was in addition rapidly deadened by the water — which will provide the fertile soil for new solutions ... large-sized metal sheets cemented firmly to the bottom, so that the musician must swim with webbed feet to bend them?[10]

My friend Petra Mandal had a dream about an instrument that I have now started to make, the *stringed coffin*: a box in body length contains the musician, and some strings are strung over the lid. Through a little hole, the musician sings and the voice directs the tones of the strings.[11]

The *finger violin* consists of two wooden laminae in the form of flat violin soundboards with five piano strings drawn through them, stretched between the fingers (which are attached to the ends through rings), and the back plate, locked behind the back and left arm. The strings, being so stiff, cannot be tightened enough by the fingers to make a clear fundamental tone, so the sound consists primarily of rumbling, creaking and overtone whistling, which is very effective with a contact microphone. Sometimes it sounds like a terror-struck choir when I bow a cluster on all strings. Other sounds can be achieved if you play on the edge of the lid with the bow, the teeth or anything, or shake the bow between the strings. Pizzicato also works, of course. An interesting sound is also the amplified putting on and pulling off of the instrument.

The violin form of the wooden laminae in the finger violin is not acoustically motivated, but a purely scenic point, which made me excited to research the scenic side of the musical performance more, especially in my solo playing. For many audiences, this side is more important than the musical one! I also started to mix with poetry, acting and objects in my concerts.

My first electric instrument, which also has some electro-acoustic possibilities, turned out to be a celebration of the 80th anniversary of the first *ready-made* by Marcel Duchamp: "bicycle wheel" from 1913 (which I was unaware of — just like I was

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7 E.g. the **triolin** and the **aerolin**, in the tradition of the "nail harmonica" and the waterphone of Richard Waters. See e.g. Rammel's essay "Instrument Invention and Sound Exploration" in **The Man in the Street — translations of some writings by surrealists in Swedish**, Surrealistförlaget, Stockholm, and his articles in EMI.

8. Double wind instruments is a very old idea, e.g. the ancient Greek **aulos**, Yugoslavian and native American flutes, and of course the bagpipe and the organ. Roland Kirk was one of the foremost in double and triple saxophone playing (with circular breathing, too!). But I actually don't know of other double trumpets, before Hal Rammel's report of having seen Lester Bowie and another one that have played two trumpets at once.

9. Long strings and their longitudinal vibrations have been used by many artists and musicians, e.g., Ellen Fullman, but playing on strings that you are hanging in yourself I have never heard of before.

10. I have come across several water-based instruments, and water drums and water flutes moreover, do have some history. Many have communicated with whales, e.g. dolphins and killer whales, with music played through underwater loudspeakers. The waterphone and the **dolphin sticks** are among the very few instruments that I have heard of are supposed to be able to be **played** under the water. The **whalesinger drum** is played floating but intended to be heard by whales (see EMI Vol. VI #4).

11. How to solve this technicality remains, but I am thinking about the idea of electromagnets driving the strings, directed by signals from a microphone by the mouth. It is problematic, though: German instrument inventor and composer Volker Staub informed me of someone who has tried electromagnetic steering of string vibrations: when the amplitude of the string becomes too big, the string suddenly gets stuck to the magnet with a bang.

Above: Brillolin (both photos)
Below: Cardboard model of the Crow Castle tried out

unaware of that it was the 100th anniversary of the Ferris Wheel). It is a copy of the same constellation of a bicycle wheel sitting on the front fork stuck through the seat of a kitchen stool, with one important addition: it still has the dynamo left. I attached the electric wires to a plug and could bring out the unadulterated sound of the power generator through loudspeakers. It is a very strong signal which put an end to a fuse in my stereo at first attempt. Later, when I made a parallel coupling with the sound signal and the attached bicycle lights, the sound signal was relieved a bit, and at the same time I got a nice light effect when playing on the dynamo! One acoustic possibility is to play the spokes, e.g. with a double bow – two violin bows put together with the horsehair in different directions (which I made to play two saws at the same time). Another possibility is to let the spinning spokes strike different materials. A contact microphone in the hub even amplifies details like the scraping of a comb on the fork. I also added a table-lamp spring in the wheel which gives a bass drone and various scraping. The name of this instrument is *veloncell Marcel.*

The *brillolin* is a further development of the hedgehog. The finger-holder is here formed like a miniature violin, where the protruding part, in two "floors" from top and bottom, comes from where the violin neck would be (later, the upper floor broke). Instead of wooden sticks, there are pieces of piano wire coming out, and additionally, two strings are placed between finger-holder and an empty pair of glasses that the musician wears on his or her face. ("Briller" means glasses in Norwegian.) The origins of the instrument is the finding of the empty glasses, which I thought had a comical quality which ought to be used in an instrument.

On an abandoned industrial site I found 22 well sounding lamp-shades of glass. I took them home, sorted them according to pitch, and made a simple stand for these *glass shade bells* with six shades. Unfortunately, the 22 rapidly turned out to reduce its number during transportations, so not many extras remain today.

My repertoire of over 30 instruments and sound tools lead to a puttering about that I want to alter with a kind of one-man band which combines bowed idiophones (saw and bowed sheet and rods of metal and wood), strings, percussion and wind instruments. I have continuously revised the outline of this instrument, till I made a full-size cardboard model and gave it the name *crow castle.*

In a dream, I have now seen a flute which is also a two-stringed bowed instrument. The finger board of the string instrument coincides with the body of the flute. A normal descending scale on the flute would result in an ascending one on the string instrument! A related bass version with a plastic tube didjeridoo and strings waits to be made.

In waked state, I have approached the road to the one-man band by playing several instruments at once: didjeridoo, piano and saw; two saws at once; finger violin and stringed stirrups etc.

Another of my waiting projects will be to build a boat that can hang freely in the air in piano wires, e.g. under bridges. The musician will stand in the hanging boat. This vision might have been inspired by my childhood reading of Jules Verne's *Lord of the Air.*

3. DEATH OF PREJUDICE.

This story is not finished – I collect and search for sounds everywhere; look for, meet and read about instrument inventors; try the sound potential of lamp-shades, household utensils, tools, pots, balloons, junk and body parts; bang, rub, knock, sing through time and matter. I feel closer to my nature, and to nature, in irregular rhythms, uncertain pitches, uncontrollable timbres and indefinable squeaking – but also with variations, contrasts against these. All or no sounds are strange or unusual – but only some have the character of discovery or revelation – what interests, inspires me most is the communication, identity, truth, openness with the context in which I meet the sound. I sometimes feel richer when I am not the whole factor of power, in the encounter with image, word, others playing or dancing, in a bigger context.

To be able to improvise freely and communicate with other musicians in the moment, it helps to leave behind sounds that tend to refer to an inner structural hierarchy, such as functional tonal harmony and regular rhythm. These willingly demand their own attention. To completely leave their commonly prevailing supremacy leaves the musicians naked in front of each other with their bodies' impulsive life and leaps between strength, weakness, rest and intensity. To leave the traditionally goal-oriented drama with its one-way time sequence demands an

electric attention to the whole rather than on one's own part, which almost automatically seems to lead to short, fast contributions, pauses and sharp changes. The better the communication, the bigger the tension and unpredictability, since the intensive listening automatically opens for the inexhaustible curiosity and desire to experiment which is always brooding behind the "presentable." "Communication" is in this case something other than "dialogue" or "conversation." A better simile would be that every participating musician and sound are poetical elements that connect sparks between each other in analogies, above the logic of the conversation. I conceive this as a surrealist state of mind.

To present a sound drama with a predetermined solution through functional tonal harmony or regular rhythm is what is usually identified as music. Without openness for crime, this corresponds to a way of thinking which grants the highest value to the functional and regular. The reaction of fear and repression against threatening crisis is to confront chaos with order. What is needed of the human spirit and body is to confront the orders of realism and adjustment with inspired and unbridled chaos, but *also* to try new and other orders – orders that arise *from* the chaos that human *desire* at the first glance seems to be. Both of these ways have been opened in music by e.g. free improvisation and instrument invention. This is not something new but has always been the case, before the music became ordered, in the now prevailing sense of "composed" – but the sight has often been dimmed by musicians having become content with, or found honor in, style making, fame or positions. There is no unified movement and there is no purity in any sense. Every honest and curious musician is a lonely example: François Bayle, Anthony Braxton, John Coltrane, Sven-Åke Johansson, Spike Jones, Thomas Magee, Phil Minton, Conlon Nancarrow, Hal Rammel, Jon Rose, Giacinto Scelsi, LaDonna Smith, Sun Ra, Cecil Taylor, Karl-Erik Welin, Christian Werner, Lasse Werner or Davey Williams (to just mention a few of those standing close enough to me or at a far distance enough) ... in relation to each other very different in temperament, style (and fame) but all alike in their release of strong powers of chaos from which new poetic orders arise, orders that show that not only music but all life can be lived in so many more, and more beautiful ways than what the law and habit command.

NOTE: My next contribution to EMI is planned to be a collection of information about other instrument inventors and related phenomena in the Nordic countries (Sweden, Norway, Denmark and Finland). I appreciate any communication about this and other topics, as well as orders of my cassettes, offers of gigs etc. My address is: Johannes Bergmark, Ekensbergsvagen 53, bv, S-117 69 Stockholm, Sweden, phone +46-8-185393.

RECORDINGS by Johannes Bergmark:

MUWAKKALS — beings are born as matter moves features most of the mentioned instruments and some others that I play.

Where saws sing and fiddles bloom — a duet with Hal Rammel featuring saw, gopychand and Rammel's inventions. It can also be ordered from Cloud Eight Audio, PO Box 724, Cedarburg WI 53012.

The Great Invisible Duo – a duet with Los Angeles percussionist Thomas Magee. I play the wave-tuned piano and some other instruments here.

Sistrum – piano solo.

These can be ordered from Surrealistförlaget, Birkagatan 25, 4 tr, S-113 39 Stockholm, Sweden.

CROW-QUILL AND "CAT"-GUT: The *Lautenwerk* and its Reconstruction

by Mitchell Clark

Ever since the musical keyboard was first developed on the organ, there has been endless experimentation in applying it to other kinds of instruments. Bars of glass, oscillators, boxes of cats – you name it: the keyboard is arguably the most revolutionary device of Western music. Much is gained – in complexity of texture, facility of execution – by placing sound sources at all your fingertips. (What is also true in many cases, where existing instrumental sound sources are given a keyboard, is a loss of nuance – the kind that is possible with the fingers in direct contact with the sounding material.)

When the piano was developed from a collective desire to add dynamic expressiveness to the harpsichord, it was a case of a keyboard instrument evolving from a keyboard instrument, and, as we all now know, the experiment was a great success. It did however usurp the roles of two important keyboard instruments – the harpsichord and the clavichord – and during the later 18th century hastened the demise of both. Fortunately, we have now come to realize that it is not an either/or situation *vis à vis* the piano on the one hand and the harpsichord and clavichord on the other. The earlier instruments are now again part of the musical scene, and the richness of the variety of styles in which each of these instruments can be constructed can again be appreciated. The harpsichord had a number of offshoots during the Renaissance and Baroque periods, and some are quite extraordinary, such as the *claviorganum* (a harpsichord and organ combined in one case and playable from one set of keyboards), the *Geigenwerk* (a bowed-string keyboard instrument), and the *Lautenwerk*.

The *Lautenwerk* (plural, *Lautenwerke;* this German word may be found spelled a number of ways), or "lute-harpsichord," is a keyboard stringed instrument utilizing strings of gut, such as those used on the lute (*Laute* in German) of the Renaissance and Baroque, instead of wire. The *Lautenwerk* is most often associated with Johann Sebastian Bach, who is known to have owned examples of the instrument, at least one of which was probably built to his specifications. Mention and descriptions of gut-strung harpsichords date from the 16th to 18th centuries, but many of these references are sketchy and there are no surviving examples of the instrument. *Lautenwerke* could be rectangular, wing-shaped (like a regular harpsichord), or oval with a bowl-shaped resonator (like on a lute). Complex *Lautenwerke*, which had several sets of jacks plucking the strings at different points along their lengths, seem to have been one of the many attempts during the later Baroque to develop a stringed keyboard instrument which was capable of greater expressiveness than the (perfectly loud enough) harpsichord and was louder than the (very expressive) clavichord. (The instrument that ultimately fit this bill was, of course, the piano.) There are claims dating from the Baroque that the sound of a *Lautenwerk* was so much like that of a lute that it could deceive a professional lutenist. But it's hard to say just how far the instrument made it past the experimental stage in its own time. It is almost the case where "reconstruction" of a *Lautenwerk* is practically a "reinvention."

This appears to have been the experience of the makers of the instruments heard on two recordings of *Lautenwerke*: Kim Heindel's *The Art of the Lautenwerk* (Gasparo GSCD-275;1989) and Gergely Sarközy's *Bach: Suites for Lute-Harpsichord* (Hungaroton HCD 12461-2; 1985). The booklet accompanying each recording includes detailed notes on the instrument used. Kim Heindel plays a single-manual *Lautenwerk* made by Martin Harpsichords (although the photo shows a double-manual instrument, also by Martin Harpsichords). It is strung with gut (two 8-foot choirs) and, for the lower-pitched strings gut with fine copper wire twisted into it to increase its density. For his recording, Gergely Sarközy constructed an instrument by rebuilding and modifying a modern single-manual harpsichord, stringing it with specially designed strings that substitute nylon for gut (one 16-foot and one 8-foot choir). Sarközy's instrument also has the capacity for a gradual change from one of the "gut" choirs to the other, allowing for an effect of change in volume and timbre. Both instruments also have a 4-foot choir of brass strings, to add brightness to the tone, and both are in the typical wing-shape (the drawing of a lute-shaped *Lautenwerk* on the cover of Sarközy's album appears to be for effect).

There are a few pieces by J.S. Bach that are thought to have been composed for *Lautenwerk,* and are among the seven pieces of Bach's which form his rather mysterious, and much-debated, output for solo lute. As the only composer that can be specifically associated with the *Lautenwerk,* it is not surprising that any recordings of modern reconstructions of the instrument would include some of these pieces. Both recordings include the *Suite* in e minor (BWV 996), the one work by Bach which has the indication "aufs Lauten Werck" in the music (although the manuscript is not in Bach's own hand). Heindel's program also includes works originally for Renaissance lute (John Dowland), Baroque lute (S.L. Weiss), and harpsichord (Domenico Scarlatti and Jacques Duphly). Sarközy's also includes Bach's *Suite* in c minor (BWV 997) and some chorale preludes.

And how do these *Lautenwerke* sound? I had long known the quote stating that a *Lautenwerk* could fool a lutenist so I was extremely curious. Certainly, one would not be led into thinking that what one was hearing on these recordings was an actual lute. Upon listening, one quickly has to give up any idea that the central purpose of a *Lautenwerk* is to "sound like a lute" – the *Lautenwerk* has to be an instrument in its own right. Both of these versions of *Lautenwerk* have a more muted tone than a harpsichord and are at times almost bottom-heavy in sound. Sarközy's instrument, having a 16-foot stop, is capable of greater range than Martin's, and the capacity for timbre and volume change, described above, can be at times quite effective. But the tone of the Martin gut-strung *Lautenwerk* is richer and warmer: it simply sounds like a better-made instrument, and actually using gut instead of nylon must contribute as well. There are times on Sarközy's recording when his instrument sounds like a poorly recorded harpsichord: too much bottom and annoying high-pitched transients. For contrast to his *Lautenwerk*, Sarközy includes on his recording a performance of a chorale harmonization by Bach ("Wer nur den lieben Gott läßt walten," BWV 690b), which he plays on a standard Baroque lute, after the first of the *Lautenwerk* suites. The contrast of lute with *Lautenwerk*

is stunning, and really shows off the difference in sound between the instruments.

And the performances? Sarközy treats his material to an extreme degree of ornamentation. In the dance movements of the suites in e minor and c minor, he freely and floridly varies the repeated sections. Sarközy's variations and ornamentation are often just too much: after listening to the e-minor *Suite* I felt a kind of musical indigestion. This was an oddly interesting thing to have happen, but not eminently enjoyable; Sarközy's lute performance of the simple harmonization of the Bach chorale that follows is a breath of fresh air (or, as it were, an antacid). Heindel's performances are more interesting, and his ornamentation always gives greater consideration to the music and less to an agenda which attempts to prove the performer to have a "very special kind of musical personality that removes him far from any kind of orthodoxy" (to quote the notes on Sarközy). Heindel's performance of the Bach *Suite* in e minor is very fine, although I might prefer to hear the lute pieces, especially the suite by Weiss, on a lute, with its many subtleties of touch. The three Scarlatti sonatas that Heindel has chosen for this recording work beautifully with the sound of the *Lautenwerk*. The instrument elicits that logical connection of a softer timbral quality with Scarlatti's music which has inspired so many guitarists to make transcriptions of his sonatas — compositions which often reflect the composer's experience of the Iberian musics he came in contact with during his years in Spain.

What I look forward to now is hearing a reconstruction of the kind of *Lautenwerk* which was made in the shape of the rounded body of a lute. Perhaps this shape would allow for a sound lighter and richer than those of the instruments described above, a sound which might even be that which could fool a lutenist.

MISCELLANY

from Bart Hopkin, EMI's editor

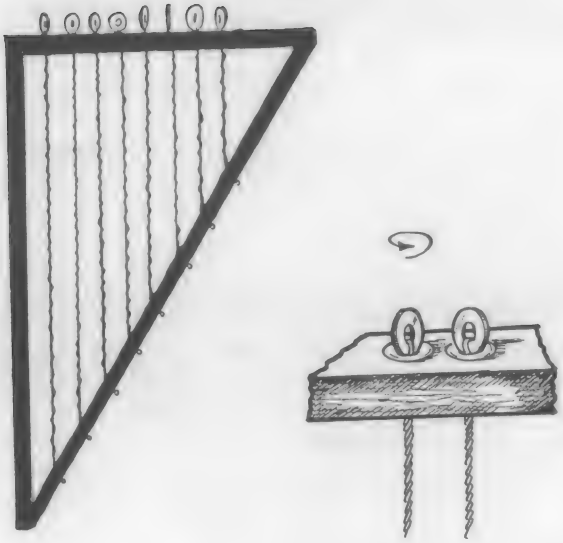
This is the first appearance of a column that will appear regularly, or perhaps not so regularly depending upon available space, in this and future issues of *EMI*. My plan for this column is to present notes on diverse topics in instrument design and construction, mostly based in my own tinkerings and fiddlings around in the work shop — tinkerings and fiddlings which are much influenced by the stream of ideas from near and far that cross my desk as I prepare each issue of *EMI*. The tone will be informal; I will emphasize ideas more than construction details; and I promise to try to keep things brief. For my first topic I've chosen something fairly innocuous, certainly not earth-shattering, only moderately useful, but still kind of cool in its way ... namely, twist-tuning.

On some drums, the drumheads are tightened by inserting short sticks between pairs of strands of lacing, and turning each stick several times so that the lacings twist together. The twisting together makes the lacings pull up shorter, and this has the desired effect of pulling the drum skin down tight. The more twists, the tighter the lacings pull, and the greater the tension on the head. It occurred to me that a similar approach might work as a tuning mechanism for string instruments.

Many early musical strings were comprised of multiple strands twisted together, and some strings — gut strings in particular — are still made this way. The twisting holds the strands together so that they act as a single string. It also allows for a string which is not as rigid as a same-diameter single strand of solid material would have been. The lesser rigidity of twisted strings was an important feature in the days before to the invention of overwinding. (Overwinding is the practice of providing a core wire with an outer wrap of finer wire, as on the lower three or four strings of a modern guitar. It has been effective in reducing problems associated with excessive rigidity in musical strings.) Thus, there is historical precedent for twisted strings. But I don't know of anyone before having used twisting as a means of tuning.

A twist-tuning mechanism for strings could take various forms. My realization of the idea appears in the diagram on the next page. The arrangement is as follows: Where a single string might have been, you take twice the required string length, which will allow you to double the string back on itself to create two strands. At the non-tuning end, the double string will be fixed by any convenient means that can anchor it securely and prevent un-twisting. At the tuning end, the string is held by some sort of cross-piece or yoke. The double string passes through a hole in the yoke. The far side of the rim of the hole is lined with a brass grommet (available at hardware stores). On the far side of the yoke, the string is looped through a flat washer, which anchors the string to stop it from pulling back out through the hole.

When this arrangement is in place, you can impart the twist to the double string simply by turning the washer. As the amount of twist increases, the tightening of the string pulls the washer down against the grommet. The downward pull creates sufficient friction between the washer and the grommet to prevent the string from untwisting itself. The more you twist, the tighter the string becomes, and the higher the pitch. The tuning process is not unlike turning the worm gears on a guitar. And, it turns out, it is just as accurate: you can easily make very dependable



PHOTOS: Twist-tuned styro-harp

fine tuning adjustments. In this respect, twist-tuning is superior to violin-style tuning pegs or piano-style pins.

Having given you the big picture, I can now provide a few more details. Bear in mind that what I am describing here is one realization of an idea that could be realized many ways. This system is especially suitable for harps and lyres.

It is easiest to start the string-attachment process by slipping the washer over the double-length string segment, centering it, and pulling the two free ends through the hole in the yoke, drawing the washer down onto the grommet. At the far end, the string may pass through a hole in another yoke, or may pass over some sort of bridge, after which the two loose ends can be tied to a hitch-pin. A wood screw can serve perfectly well as the hitch pin. It is important to pull all the slack out of the string when you make the tie to the hitch pin. The more slack in the string to begin with, the more twisting it will take to pull the string tight. Excessive twisting has several disadvantages, among them that it weakens the string. Overly twisted strings are prone to breakage.

If several strings are to be mounted close alongside one another (as is often the case with harps and lyres), there is a potential problem that the washers for adjacent strings will get in one another's way when you turn them. To alleviate this, the washers must be small enough in diameter to can clear each other. The same is true for the grommets. For closely spaced strings this calls for rather small washers, making tuning by hand an uncomfortable process. In that case, some sort of simple tuning wrench, fashioned to fit over the washers, may be in order.

Strings need to be rigidly anchored, or they will dissipate their energy shaking their mountings in a manner that doesn't contribute efficiently to sound radiation. One problem with twist tuning is that the washers are not as rigid as they should be — they are too free to wiggle. The result is some loss of transmission and a reduction in the sustain of the plucked string vibration. The situation can be improved with more massive washers, but this may lead to other problems as mentioned above. I can imagine other solutions, but they sacrifice the available-materials-simplicity of the design described here. The loss of efficiency is not severe; still, it might be worthwhile for anyone pursuing this idea seriously to try to come up some way to give the twist-string a solider end-point.

In choosing diameters for twist-strings, you will need to begin with single-strand string diameters a little over half what you expect would be the best diameter in the given application. But string scaling for twist strings cannot be an exact business. This is because the amount of twist is a factor in the effective string diameter (the linear mass of a string with many twists per inch is greater than that of the same string with fewer twists per inch). Since you don't know just how much twisting will be required to reach the desired pitch, there will always be guesswork in the process.

I have found that twist-stringing works well with nylon strings and steel strings. I suspect that it would work well for gut. Brass strings, in my very limited experiments, are more prone to breakage under twisting. (Too bad — I've been on a brass-strings kick lately.) For practical purposes twisted strings behave very much like ordinary strings acoustically, and sound much like ordinary strings of the same material but for the slightly increased damping due to the non-rigid mounting.

I chose to make a harp for my prototype twist-string instrument. As you can see from the photograph, I was too lazy to make a proper harp sound box. Instead I just constructed a basic frame harp — it would be a triangular harp but for the fact that I gave some curvature to one side. Then I attached a styrofoam picnic cooler to the pillar. Yes, it's no longer a secret: styrofoam is the most effective sound radiating material around. The combination of being extremely light yet reasonably rigid means that you can add a great deal of radiating surface area to any vibrating body with minimal cost in terms of added mass or frictional loss. With the cooler attached, what had been a *very quiet* little frame harp became a reasonably audible little styro-harp.

SPEED BUMP MUSIC (The work of Tim Buckett)

By Mike Hovancsek

A few months ago I was talking with my friend, Tim Buckett, about his unique sound sculpting ideas and it occurred to me that some of these ideas would be of interest to *EMI* readers. In particular, Tim was telling me about his interest in the hum that is produced when a car runs over a series of small speed bumps.* The pitch of the hum is altered according to the speed of the vehicle, the size of the bumps, and the spacing between bumps. He wondered if it would be possible to arrange these raised patterns so that they would produce a sequence of pitches (a melody) as the vehicle rolls over them. The result would be a lot like being the passenger on a phonograph needle as it passes over the grooves in a record.

Tim thought that speed bumps could be arranged on playgrounds so that when kids ride their bikes over them, simple melodies are sounded. He also had some amusement park ideas on which I will elaborate later in this article.

I mentioned to Tim that I have seen voice analysis equipment that codes the human voice into a series of bands. I wondered if this kind of technology could be used to create the simulation of a voice in the speed bump hum so that, for example, the bumps could produce the sound of a voice saying " stop ahead" or " exit 10" or something similar. The freeway idea would be an inexpensive and practical alternative to signs. It would actually be superior in situations in which poor visibility makes conventional signage ineffective.

Once the bump patterns are determined, they could be applied to large sheets of plastic that, when it is peeled off, reveals an adhesive side to the bumps. It would be like a large speed bump decal that could be stuck to the road. When I suggested this, Tim added that the speed " bumps" could actually be *depressions* in the road. I imagine that this type of pattern could be made with iron plates that could be pressed into the hot asphalt like cookie cutters when the road is being poured.

As far flung as these ideas appears to be, keep in mind that they are based largely on technology that already exists in the form of record albums and speech pathology equipment, It seems that the main obstacle would be creating a computer program that can translate sound into a series of bands that correspond to the limitations of the human ear and the abilities of the sounding devices.

Tim envisioned an amusement park in which cars drive through modified roads that produce a series of melodic passages. He thought that it would also be interesting to have visual images painted onto the roads so that the movement of the cars would create movement of the visual images as well. If something could be attached onto the headlights that would produce a strobe effect, the result would be a lot like a film with sound bump accompaniment.

At the onset, there is a basic problem with this idea. Since there are two sets of wheels on a car, it would " read" the speed bumps *twice* (once for each set of wheels) and would, thusly, produce an echo effect. I suggested to Tim that this problem could be resolved in the amusement park situation by placing speed bumps in the middle of the road and using three wheeled vehicles (which have only one wheel in the middle).

Tim mentioned that this echo effect may not be a problem in the freeway situation because the cars would be traveling at such a high rate of speed that it would be a " tight" echo (meaning that the second sound would appear so closely to the first that it would sound like an inconsequential reverberation).

Echo effects and other properties of the speed bumps can also be integrated into the intended sound. For example, having a right and left wheel would make stereo effects possible and echoes may sound interesting as well. There are a lot of possibilities here.

Obviously, there are simpler and more high tech ways to produce visual and auditory sensations (films and the like have been around forever) but there is something really appealing about the unconventional and organic qualities to these ideas. All of Tim's ideas are like this. He is the type of person who likes to buy used VCRs, tape recorders, and other bits of discarded technology for projects that go well beyond the original intentions of the designers. Whenever Tim and I get together we end up feverishly tossing around ideas for hours on end. He is a truly original and intelligent artist who deserves a lot more recognition than he gets. The speed bump idea discussed here is only one of dozens and dozens that he came up with in the course of our conversation. Contact him.

Tim can be reached directly at 409 S. Chestnut St., Ravenna, OH. 44266

*The word "speed bump" as it is used here refers to the series of small raised strips in the road that are often used to alert drivers to railroad tracks or other possible driving hazards.

BOOK REVIEWS

By Bart Hopkin

CLAIRE JONES: **MAKING MUSIC: MUSICAL INSTRUMENTS IN ZIMBABWE PAST AND PRESENT**

Published in 1992 by Academic Books (Pvt.) Ltd., P.O. Box 567, Harare, Zimbabwe; available from Dandemutande Gifts, 1711 East Spruce St., Seattle, WA 981225728

The author of *Making Music*, Claire Jones, is an American who has been living and working in Zimbabwe for several years. Her book is designed to fit a particular purpose and meet a particular need: it is a resource book for Zimbabwean teachers at the primary and secondary level. Some parts of it, as a result, will not be especially useful to general readers elsewhere. But the greater part of this book, with its southern African perspective, has potential value well beyond its intended audience.

The most interesting sections for *EMI* readers – and these sections comprise over half the book – are those devoted to the making and playing of Zimbabwean instruments. The author describes forty or so different instruments of all sorts (winds, strings, drums, idiophones), and provides building plans for about ten of them, ranging from simple to moderately complex. She also works hard to provide context for the instruments shown in the plans, discussing playing technique and typical musical styles as fully as space allows. Her plans and instructions have, it seemed to me, about the right balance between prescriptive detail and open-ended flexibility. Particularly strong in this book is the section on mbira – not surprising, since the musical culture surrounding that instrument is particularly strong among the Shona people. Also strong are the sections on marimba, including discussions of mirliton (buzzing membrane) resonators, and various musical bows.

Let me just mention a few aspects or specific topics in Jones' book that happened to catch my interest:

The materials lists for the instrument plans reflect the difficulty of obtaining in Zimbabwe tools and materials that might

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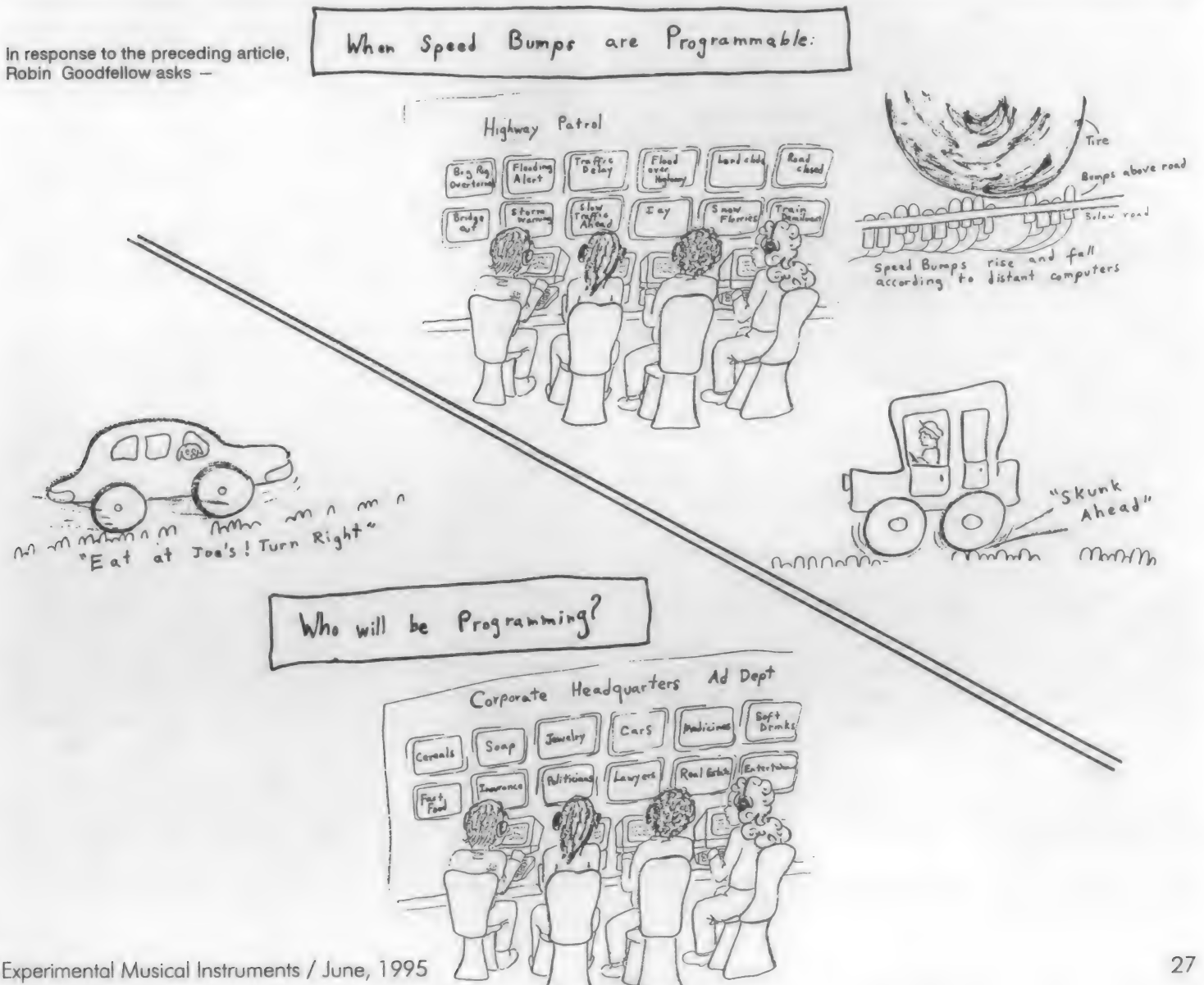
In response to the preceding article, Robin Goodfellow asks –



be taken for granted in the west. For such things as eye bolts or even plain steel wire, Jones suggests salvaging or fabricating, rather than purchasing.

Jones' brief history of the the marimba in Zimbabwe is intriguing. It seems that through the pre-colonial and most of the colonial period in what is now Zimbabwe, marimba-like instruments were rare or non-existent. "The marimbas that are made and played in Zimbabwe today," Jones explains, "are a modern version of the instrument that was introduced into the country in the early 1960s by the Kwanangoma College of African Music (now the Music Department of the United College of Education)." The instrument was chosen for instructional purposes in part because, while it possesses a distinctly African history, it has no potentially divisive associations with specific ethnic groups in Zimbabwe. The design that was developed at the college incorporated features of various marimba-like instruments from nearby areas, with some local modifications. The instrument is now widely used in Zimbabwe.

Perhaps with a similar idea in mind, Jones suggests that steel pan, Trinidad style, is another instrument that might well take root in Zimbabwe. She presents a plan for a small, easier-to-make pan made from a 5-gallon can.

Other instruments that I especially enjoyed reading about include the Shona Chizambe, a mouth-resonated musical bow sounded by scraping along the notched surface of the bow using a scraper with built-in rattles, and a string bass, once used in Zimbabwean popular music, using something like a washtub bass design.

A minor cautionary note: among the not-as-useful-for-outsiders portions of this book, beware of occasional bits of faulty information in the section on acoustics.

DAVID HOGAN SMITH: **REED DESIGN FOR EARLY WOODWINDS**

Bloomington & Indianapolis: Indiana University Press, 1992. Available from Continuo Marketplace, PO Box 327, Hammondsport, NY 14840.

David Hogan Smith's reed design book is intended for makers and players of the early European double reed instruments, most particularly shawm, curtal and crummhorn. (The subject of single reeds is not addressed.) Smith's information will also be valuable to makers and players of other more obscure early European double reeds, as well as early and modern bagpipes, and non-European double reeds. In addition, though Smith doesn't anticipate this, it will be valuable to people interested in exploring new designs for double reeds rather than replicating old.

Smith addresses both the practical aspects of double reed construction and the acoustic underpinnings of reed behavior. His exposition of acoustical matters is extraordinarily thorough as well as insightful, not to mention solidly based in both practical experience and theory. (It will be rather dense for the casual reader.) The portions of the book devoted to construction are similarly thorough and solidly grounded. For the small number of people who want to explore this admittedly narrow subject area exhaustively, this is the book. For the slightly larger number of people who simply would like to know a little more about double reed design — well, this is the book for them too, though they might not read it quite as painstakingly.

MARTIN VOGEL: **ON THE RELATIONS OF TONE**

Translated by Vincent Jean Kisselbach; edited by Carl A. Poldy. Published by Verlag für Systematische Musikwissenschaft, GmbH, Bonn, 1993. Originally published in German in 1975 as **Lehre von den Tonbeziehungen**.

Martin Vogel is a scholar and intonational theorist with over a dozen books to his credit on topics in musicology, music theory and analysis. His newly translated *On the Relations of Tone* first appeared in German in 1975. It's a big book at over 500 pages; big and very full. The topic is intonation theory, and the approach is wide-ranging and inclusive, making it one of the major works in the field (though not well known in the U.S.). Vogel starts with rudiments, discussing frequency ratios using string-length ratios as a model, and proceeds rapidly into more specialized territory. Along the way he discusses historical development of intonation systems and intonation theory in European music, and reviews the work of a number of important theorists, both early and more recent. He presents various conceptual models for tonal relationships — his own models and those of others — as well as graphic and notation systems. He talks about acoustic musical instruments that he and others have devised for the purpose of realizing specific tunings, as well as the potential for still greater intonational refinement with electronic instruments.

Vogel observes at one point (p. 93), "Unfortunately, no one has yet written a thesis on instrumentation based on acoustics..." He then goes on to address this topic himself. He presents a uniquely direct, if somewhat mechanistic, take on composition and orchestration from the point of view of how specific instruments, with their characteristic overtone blends, function in different harmonic contexts.

The study of intonational theory, as practiced by numerous academics over the years, has developed a reputation for being arcane and fussy. And indeed in Vogel's hands the subject matter is almost entirely abstract and theoretical. Yet, although it takes a while to get a feel for this, Vogel's approach is expansive, conversational, sometimes rambling; it reads not like a math text, but like a discourse. It is not as dense as it may initially seem.

A number of anomalies arise in translation. Some appear simply to be Germanisms that didn't quite make the leap into English. In most cases it's not difficult to determine the intended meaning. More problematic — for me, anyway — was the decision to stick exclusively with German tone nomenclature throughout. This includes not only the H for B*b*, but enough additional note names to fill a chart in the back of the book, starting with *aisis, ais, a, as*, and *asas* (for A##, A#, A, A*b*, A*bb*), and ending with *gisis, gis, g, ges* and *geses* (for the G family).

Vogel's presentation of intonation theory, broadly speaking, is correct and solid. (I say this after speaking with a couple of intonational theorists on this side of the Atlantic who are familiar with his work, since I lack the background to make such a judgment myself.) His orientation differs from most of the American intonationalists in that his work seems geared more toward refinement than exploration. In some instances his presentation may seem more elaborate than what would be called for by any but the most dedicated reader, as when, for instance, introduces his own system for charting frequency relationships with a set of graphic symbols. I suspect that those symbols, once familiar, might represent essential aspects of tone relationships with admirable simplicity and clarity, but on first encounter they're likely to strike the reader as yet one more body of arbitrary abstractions — in this case,

graphic icons – to memorize. Why not (one is tempted to say) just stick with ratios? But then again, this is a very complete book, with a ton of information in it. If it seems like a great deal to absorb, well that's a natural result of its very exhaustiveness.

On the Relations of Tone is almost entirely about pitches, and mathematical relationships between pitches. When Vogel does touch upon purely physical aspects of sound production, his grasp is less sure. But he does include discussions of several instruments used to play in special tunings. There is a very early 31-tone piano-like instrument, with, as an included photo shows, quite a keyboard. There is a description of a clever capo-like system to provide transposability in keyboards or other many-stringed instruments with simple trapezoidal string configurations. There are a number of organs, again often with fantastic keyboards, including a 72-tones-per-octave harmonium which Vogel commissioned. There are brass instruments (trumpets, tubas, French horns), constructed under Vogel's direction, with the added tubing lengths for each valve calculated for ideal tunings, augmented by small slides for finer adjustment. There are refretted guitars. Vogel also discusses possibilities for electronic instruments, in connection with which he advocates scales of 126 and even 171 tones per octave. He presents his own elaborate keyboard design, and also calls for circuitry to automatically justify intervals in real time for simplified playing.

Early on in this work, Vogel explicitly rejects noise components as part of music: "The very fact that one strives to reduce the incidental noises due to bowing, blowing, etc., to a minimum indicates that they are not legitimate components of musical art. ....The incidental noises arising from the range of noise color are immaterial for our purpose" (p. 44). Vogel's writings throughout the book are largely based upon an assumption of harmonic timbres, and this suggests fairly rigorous criteria for what does and does not constitute noise. But there are plenty of people who would disagree with such disenfranchisement of unpitched sound in music (including much of the orchestra's percussion section), and many more who would question whether they can be so easily told what constitutes "legitimate" musical art. My purpose in bringing this up is not to revive a tired argument about what is and is not music, but rather to illustrate this quality of Vogel's outlook: he is a purist and a perfectionist in tonal matters, and he operates within a theoretical arena at a remove from the rough, exciting world of sounds that we actually live in. This rarefied view will be off-putting for some. But it makes for good instruction, allowing Vogel to address tonal questions with clarity, precision, and singleness of purpose. And more: theory is tempered by reality, as he has built, or has had built, many of the the diverse instruments experimental instruments described.

RECORDINGS

RECORDINGS REVIEWS

By Sasha Bogdanowitsch, Mitchell Clark, Tom Nunn and René van Peer

EASLEY BLACKWOOD: **MICROTONAL COMPOSITIONS**

Cedille CDR 90000 018 (1994). On CD from Cedille Records, 700 W. Barry Ave., #3E, Chicago, IL 60657

The majority of this CD collection is given over to Mr. Blackwood's *Twelve Microtonal Etudes for Electronic Music Media* (Op.28). These *Twelve Etudes* were composed in 1979-80 as part of a research project to study divisions of the octave into from 13 to 24 notes. Practical exploration of microtonality is not an untrodden road, but when Mr. Blackwood claims in his liner notes that although "interest in microtonal music is as old as music itself," the process of exploring microtonal possibilities in music before electronic media was "too slow and inaccurate," he does seem ignorant of the works of important composers in this area like Harry Partch, Ben Johnston and La Monte Young..

Mr. Blackwood leads us through each of the *Twelve Etudes* with detailed liner notes. Upon reading his notes it appears that what he was after was rationalizing each of the tunings into the context of Western tonal music, and that if he felt that was not effective or possible in a given tuning, he gave it some treatment outside the quasi-tonal fold. In some cases, it seems that certain tunings suggested certain associations (perhaps solely on a theoretical level) and that he just went with those associations. For example, as the 23-note tuning contains "an intriguing arrangement of the two distinct pentatonic modes of Java and Bali, known as *pelog* [sic! — *pelog* is a heptatonic {seven-tone} mode, not a pentatonic {five-tone} one] and *slendro*," the etude is in a quasi-*gamelan* style. Although Mr. Blackwood's compositional technique is certainly polished, his compositional choices in these pieces are often very facile. Listening to the *Twelve Etudes,* I don't really feel like he's really exploring the material so much as super-imposing it on one recognizable musical form or another.

It must be admitted that, intentional or not, the skewed results are occasionally enjoyable, in that there's really nothing else quite like this. Everything's here — classical music, jazz, world music, marching band music, science fiction movie soundtrack music — all ending up sounding like it's more or less out of tune, and sometimes, somehow logically so. Perhaps, in the end, any criticisms of the *Twelve Etudes* are unjust — Mr. Blackwood did in these pieces what he set out to do: "write a composition in each tuning to illustrate good chord progressions and the practical application of the notation." It's too bad his investigations of microtonality were made with so little actual exploration.

—MC

CHARLIE CHRISTIAN, ELECTRIC GUITAR (in ensemble with various others): **CHARLIE CHRISTIAN COMPLETE EDITION — VOLUME 1:1939**

Media 7 MJCD 24 (1992). Available on CD in records stores (Media 7, 15 rue des Goulvents, 92000 Nanterre, France)

For any musical-instrument innovation to become established and widely disseminated, it does require some collective effort — or occasionally one person who focuses the effort — to bring to it musical reality. Instruments (let alone genres of music) which have become commonplace today may have been subject to a great amount of

experimentation in their own day — and of course faced the possibility that they might not have caught on (and would be, at best, curiosities today). Charlie Christian, the jazz guitarist from Oklahoma City who recorded during 1939-41, brought to the nascent electric guitar the artistry which was the major push which allowed it to become the established instrument (at least in the context of jazz, if not in wider contexts) that it is today.

The early technology of the amplified guitar, involving initially a contact microphone attached to the body of a steel-string guitar, emerged during the early 1930s. The acoustic guitar had had a limited role in ensemble jazz because of its quiet sound. Acoustic-guitar solos had to take place with the rest of the band playing in a hushed fashion, or were chordal, rather than single line, in style (as in Lionel Hampton's "One Sweet Letter from You," in this volume — one of the few recordings of Christian playing acoustic guitar). Amplification allowed for more presence to the guitar and — very importantly — an audible sustain to its sound. The 1930s were the decade of initial experimentation with the electric guitar in jazz; the instrument really took off with Christian's recordings beginning in 1939. (The use of electricity in the production of instrumental music was off and running at this time — 1939 is the same year, incidentally, as John Cage's *Imaginary Landscape No.1*, his first work involving electrically generated sound sources.)

This collection of Charlie Christian's earliest recordings, made from August to October 1939, is the first volume in a projected series of eight to include all the recorded material — studio, broadcast, and concert — in which Christian can be heard playing a solo. Although there are occasional recordings in which Christian plays acoustic guitar (such as in the Hampton selection mentioned above, and in the 1941 Blue Note sessions of the Edmond Hall Celeste Quartet, which also featured Meade Lux Lewis on celesta, included in volume 6), the vast majority show Christian at the instrument which he would revolutionize by means of his own genius — the electric guitar.

Most of the recordings in this series feature Charlie Christian as a side-man with the Benny Goodman Sextet, for a just under two-year period from 1939 to 1941 — Christian was to die of tuberculosis in 1942. Benny Goodman, in his small ensemble groups of the later 1930s, sought an instrumental combination rich in timbral contrasts. He experimented with including electric guitar during 1939, but was apparently not satisfied with the results until the 23-year-old Charlie Christian came along in August of that year. His results with Christian were astounding, from their first recording session on to the last recordings during early 1941. Alternate takes and live versions abound in this series, so a number of the songs are repeated (five renditions of "Flying Home" on the first volume, for instance). It is Christian's incisive solos which help keep this material fresh now.

Late in his short life, Christian was to branch out from the swing jazz of the Goodman group to play with trumpeter Dizzy Gillespie and pianist Thelonius Monk (the live recordings made with them at Minton's club in Harlem, New York, should be forthcoming in this series). Many have speculated that Charlie Christian would have played an important role in be-bop if he had lived longer.

This series is put together (obviously very lovingly) by Claude Cartiere (who authored the liner notes, given in both French and English) and Jean-Claude Alexandre. Each volume includes detailed information on the recordings, as well as occasional other technical tidbits. Purchasing the entire eight-volume series may just be for die-hards, though — for smaller collections which give an overview of Christian's playing, others may prefer either of the two Columbia Records collections presently on CD.

—MC

ECHO CITY: **THE SOUND OF MUSIC**

On CD from Echo City, c/o Giles Perring, 7 Mornington Terrace, London NW1 7RR, UK

Echo City is a six-member group from London, England, specializing in workshops and performances with instruments that they designed and built themselves. One of their aims is to get people to participate in their music. Using self-built instruments to that end is perceptive: their unusual shapes invite playful investigation as much as the fact that they don't carry the weight of ancient academic tradition with them. *'The Sound of Music'* makes clear that the group must be able to activate people by the beauty of the sounds and the informal openness that is characteristic of their improvisations. Judging from the CD the music itself is its best advocate: testifying that making it is great fun; that making it together is sure to create the intense pleasure of communal activity and shared experience. If you don't go for that, then you can also just lose yourself happily to the hoarsely resonant roar of pyrophones, to the clang and hum of bells and many other great sounds. Their bio states that they have created music to be performed by an entire village. Sounds like the thing for Los Angeles. The sound of music may come as a revelation there.

—RvP

DAS FROHLICHE WOHNZIMMER: **BUY BUY LOVE**

Susa Binder, Ilse Kilic, Stefan Krist, Fritz Widhalm [no address/phone given]

Here is one crazy CD! These are songs in the spirit of free improvisation, but with an *experimental* edge where change is always dramatic and frequent, yet each moment contributes to a very convincing musical character. There is something almost Webernesque here, though dealing with very different concepts and styles — it has a clarity, a formal/structural clarity, as crazy as it is! This is achieved through juxtaposition — there are no real transitions, nothing gradual. Instead, bizarre (and often "dirty") sonic spaces appear one after the other, in a seemingly free associative — or rather, in this case, free dissociative — formal expression. One could call it "linear collage," not simultaneity but strings.

The liner notes of this CD consist simply of song lyrics — and as might be expected, they are wild! Although these lyrics are titled (e.g., "Expose Yourself," "Do We Need Nature," "Fucking Slow (For Lisa Suckdog)," etc.), the music seems continuous; one could hear it as one piece. Perhaps, though, that's just how I heard it. Those more accustomed to listening to songs (around 3 minutes in length) may hear these as distinct pieces. Nevertheless, the style is so bizarre for all of them that a certain continuity and wholeness is evident.

The clarity of the textures, characters and juxtaposition-type changes provide a strong foundation of form, structure and style for the unabashed weirdness of the content. Again, the word "dirty" comes to mind. "Raw" is another one. Das Frohliche Wohnzimmer is delightfully schizophrenic in its ability to bring these contradictory forces together in an entertainingly shocking sound experience.

The CD is quite short (18'31") but all the more effective, as it is densely packed with meaning, energy and... what can I say?... dirt. For some listeners, however, those with a taste for the unusual, outside, bizarre, weird, different, etc., this music is *pay* dirt!

—TN

JUAN GARCIA ESQUIVEL: **ESQUIVEL!**

Bar/None Records AHAON-043 (1994). Available on CD in records stores (also available on LP)

During the decade from 1958 to 1968, Juan Garcia Esquivel was an active arranger and bandleader on the *Easy Listening* scene, recording some dozen albums (and that's including a five-year hiatus from recording), and producing some of the most truly imaginative orchestrations and performances of the genre. This new collection of his work gives a very good selection of Esquivel's appealing and zany output.

Not to labor the word *experimental*, but it must be pointed out indeed how experimental Esquivel was in his choices of sounds and his

use of these sounds. Placed along side his contemporaries in the arena of easy listening (the likes of Henry Mancini, Ferrante & Teicher, Paul Muriat, to name a few), Esquivel is clearly the most experimental, and most intelligenty experimental, of anyone who worked in this style. Gimmicks abound in this genre (Dean Elliot's *Zounds! What Sounds!*, The Sounds Orchestral's *Impressions of James Bond)*, but in Esquivel's arrangements the effects are structural, not just tacked on so as to catch one's attention. Contemporaries recognized the uniqueness of Esquivel's sound: Ernie Kovacs — TV's early genius who is today considered as a pioneer in video art — used Esquivel recordings in an "animated office" sequence (who, who has seen this, can forget that pencil sharpener whistling "Sentimental Journey"?). And surely, television composers and arrangers were listening closely to Esquivel (unless it was the other way around, and given the creativity and consistency of Esquivel's work, I don't think it was).

Some of the sonic hallmarks of Esquivel's unique orchestration — which he called *Sonorama — were* amplified slide guitar, solo (human) whistler, a chorus which sings texts like "pow-wow-wow," "zu, zu, zu, zu, zu," and "boink! boink!", low-range instruments used for their unique timbres (bass accordion, bass flute, bass trombone), as well as all kinds of keyboards (played by Esquivel himself). This collection's opening selection, "Sentimental Journey," for instance, contains most of these. Esquivel also tried out various electronic instruments such the Ondioline (showcased in his late-fifties tune "Whatchamacallit") and the theremin. On "Lazy Bones," Esquivel makes use of a jew's harp, which he combines in the melody with harpsichord and the *buzzimba,* described in the notes as "a one-of-kind instrument that is struck with mallets and sounds like a low-register resonant clarinet." And Juan Garcia Esquivel's *instrumentarium* was clearly enriched by all sorts of Latin percussion.

Indicative of his talents as an arranger, Esquivel's use of unpitched percussion was with great sensitivity to the sonic complexity of the individual sounds. The timbral colors of unpitched percussion seem to become *pitched,* as it were, when irresistably attracted by the magnetic forces generated by the swirling amalgam of the orchestra as a whole. The outer-space imagery suggested by the titles of some of Esquivel's albums (*Other Worlds, Other Sounds* and *Infinity in Sound)* is appropriate: this is *The Music Of The Spheres* of easy listening.

Given the quality and quantity of Esquivel's output in the late '50s and early-to-mid '60s, it is a bit of a disappointment that this full-price CD reissue collection contains only just over 38 minutes of music — little more than the 1966 LP, *The Best of Esquivel.* Bar/None may well be saving such gems of Esquivel's as "Cherokee," "Snowfall," and "The Third Man Theme" for a future collection (or collections), but still, the present album does seem a little bit skimpy. And a few of the tunes seem to be included for certain off-beat features (for instance, "Mucha Machacha" with its dialogue section, and "Whatchamacallit" with its use of the Ondioline), but are not very satisfying examples of Esquivel's work.

The final word in the credits asks us, "if you are delighted to discover the music of Esquivel— thank byron werner." Well, thank you, [B]yron [W]erner, but I must say that here in the Bay Area, many of us discovered Esquivel a few years ago, thanks to the enthusiasm of record collector and easy listening afficianado Ken Sitz, who privately circulated copies of a not-for-sale cassette compilation of music by Esquivel. Ken's labor-of-love anthology contained twenty titles documentated as to source and date (compared to Bar/None's fourteen undocumented selections) and presented a fine portrait of Esquivel's output. Still, Bar/None's collection is a great thing to have, and remastered, this material sounds excellent.

—MC

TILMAN KÜNTZEL; **WIR FANGEN DAS MÖGLICHE**

On CD from the composer at Sultenweg 55, 21339 Luneburg, Germany

"We catch what is possible when we lay our head on the table," says a woman whose voice is part of a procession of sound extracts. Maybe my perception grabs her words as the axis, just like a dolphin might hold on to the whistles and twitters of its species a few moments earlier. At this stage I am halfway through the first part of sound artist Tilman Küntzel's CD *Wir fangen das Mögliche* — we catch what is possible. It is the catalog to an exhibition of his work in the German city Baden-Baden. Both in his visual and his sonic work he uses commonplace ingredients without inhibition; combining these with highly incongruous elements he achieves fascinating pieces.

The exhibition itself consisted of works in several spaces, conceived as rooms in a house. The dining room held a plate with soup on a pedestal. Driven by a mechanical device a spoon slowly stirred the liquid, making it look ever more unsavory (scene from childhood: "I am not going to eat **that**, no way"). The living room had an inflated globe on a loudspeaker cone. Whenever a tape played (Dixieland, the speed five times reduced), the ball would lift itself majestically off its support propelled by tones below the hearing range. In a later work he used garden gnomes, comparable to the snatches of abysmally trite *Schlagers* on this CD.

Küntzel calls his projects 'situations for perception', which sounds like a sensible enough description. The sound works on *Wir fangen das Mögliche* are at the same time less and more than music. They don't string together into sequences that follow melodic, harmonic or even logical rules. This procession of sonic incongruities is more like a stream of consciousness — but one that is composed, mind you. Each particle in that stream may serve as a panoramic outlook, a point from which to view back or ahead, letting your imagination flow along. Each may change your appreciation of what came before or will follow after. The best you can probably do, is try to catch what you can, like Küntzel did, and marvel at the prospects.

—RvP

DIDIER MALHERBE : **ZEFF**

On CD from Tangram Music, production APSMT, distributed by New Rose

What draws one first to this recording is the striking cover photograph of a one-holed twisted piece of plastic and the print in large calligraphy letters saying : *Zeff*. Zeff is derived from the Greek word *zephyr*, and is French slang for wind, and there is no question in my mind why over half the pieces on this disc bear that word in their title. All the tracks have a constant 'zeffy' presence, exploited to its fullest in the variety of instruments played by multi-instrumentalist Didier Malherbe.

It is Malherbe's unique instrument, the *circular plastic bass flute*, that stands out the most, surely being the personification of Zeff throughout. Though limited to drones, harmonics, and its large flute bass sound, the circular plastic bass flute steals the sonic spotlight from other wind instruments, such as the Indian *bansuri* bamboo flute, clarinet, ocarinas, and acoustic and MIDI saxophones. Shamal Maitra provides the rhythmic bed with *tablas*, *ghatam*, *djembe*, *sanza*, and bells and gongs. Guest artists, including Jean-Philippe, Henri Agnel, and the Kouyates, contribute such wide-ranging instruments as *balafon*, *kora*, *sarod*, piano, bass, and synthesizer.

Three major textures or styles of composition are heard throughout the disc: first, typical theme-based jazz/world-music jams, second, ambient compositions dealing notably with the exploration of timbre and the subtle shadings of instrumental combinations, and third, pieces that have both of those elements, but transcend the two at the same time.

Categories one and two, however tasteful they may be in construction and improvisation, do not stand up well when compared to the uniqueness of the third category, which shines forth only in relatively few pieces on the disc. "Zeff in the Box," "Zeff Dance," and "Impromenade" are some of those special pieces that highlight the circular plastic bass flute the most, and in so doing are able to unite those elements of world beat and jazz improvisation into a new hybrid music.

—SB

HUNTING DOWN A NEW SOUND: Modified Game Calls and Predator Calls

by Jonathan Chang

Most game calls and predator calls are devices that are normally used – perhaps abused – by hunters to attract or frighten prey. Many game calls and predator calls are very similar to reed instrument mouthpieces. These devices are usually hand-sized barrel-tubes made of wood, plastic or high-tech rubber that have a reed – either covered or "free." The "free" reed calls are so numerous and various as to defy easy description; suffice to say that one can obtain a whole gamut of "extreme" wind instrument sound colors. Many of the covered reed calls are similar to the 17th century European shawm, an early ancestor to the oboe, in both construction and sound. Most reeds are constructed with thick plastic, but some are made of metal.

The sonic-musical potential of game and predator calls has usually been overlooked or spurned by those who have rigid views of music and the world of sound. However, there are a few people already well-known in the New Music "scene" for using duck-calls and other game calls ... John Zorn, George Cartwright and Michael Lytle are three that immediately come to mind. But none have made these devices their main instrument.

Personally I avoid duck calls as being too much of a John Zorn shtik. My favorite devices are predator calls. Used by "big game" hunters who are after foxes, coyotes, bobcats, wolves, cougars and bears, these devices sound like various helpless animals in distress.

Playing these predator call devices can be louder and shriller than a good, cathartic Primal Scream session (and you won't lose your vocal cords) ... kinda Dada-esque with a nasty visceral, psychological "edge." [see warning below under "Modifications"]

Playing several call devices all at once is another "strategy." The trick is getting two or more call devices into one's mouth, then blowing hard and evenly enough to attain the effect or effects one wishes.

And it won't hurt to gain some skill in circular breathing technique to create a continuos stream of sounds. This technique is widely practiced all over the world by wind instrument players and by glassblowers. Circular breathing can be learned and practiced by blowing through a straw into a bowl of water. Just before running out of breath, fill cheeks with air; then force remaining reserve of air with facial muscles while rapidly inhaling more air through your nose.

MODIFICATIONS

It is wise to modify these appropriated hunting devices. Some game calls and many predator calls are not only limited in tonal range and sound color variation but are actually a tad too piercing and loud for reasonable indoor musical use. If you want to lose your audience and your hearing really quickly, go ahead – blow out your eardrums.

On the other hand, I've used them unmodified and un-miked in amplified music situations. In one "improv-core" gig – outdoors on a San Francisco Bay pier – my unmodified predator calls did not need any amplification to be heard over the electro-acoustic stringed instruments and amplified drums.

The easiest modification is to extend the call device with either a straight tube or a long, narrow, conical, megaphone-like tube. Thus the call device acts like a reed instrument mouthpiece and the tube creates an enclosed, vibrating column of air. This tube can have as many tone-holes as you like or none at all. This, of course, expands the tonal range and the possible sonic textures.

Even easier is to simply attach a fairly long flexible rubber tube (like a small vacuum hose or similar heavy-duty rubber hose) that can fit fairly tightly around the "bell" end of the call device ... this creates a mutant hybrid of aerophone and whirled instrument that can be simultaneously blown and whipped around.

Taping or gluing a large-sized kazoo or mirliton to a call device will create an "aggressive" instrument capable of densely-layered buzzing sounds. You may need to replace the kazoo's original "buzzer" membrane with one made of stronger material; a piece of cellophane, tinfoil, wax paper, potato chip wrapper or thick rice paper should work.

An immensely rewarding modification is to attach a call device to the body of a wind instrument (i.e. bamboo flute, clarinet, oboe, soprano saxophone, etc.). This may take some hardware and handicraft skill. The instrument body does not have to be in perfect condition; the semi-dysfunctional instruments can be pretty interesting with their various idiosyncrasies. Fairly cheaply, you can acquire "dead" instrument bodies from musical instrument repair shops – the repair people call them "cadavers" and they normally "cannibalize" them to repair other instruments. Before the repair people laugh at you, bring out a couple issues of *Experimental Musical Instruments* when you explain what you are trying to do. It's amazing what the printed word can do to the musical philistines among us!

A more complicated modification can be done to the "reed" of the call device itself. Carefully trimming and lightly sanding will dramatically change the tone and texture of the sound. One can make replacement reeds with any reed-like materials ... recyclable plastic, bamboo, or thin metal. In this way it is possible to get less of a distressed-animal sound from the calls.

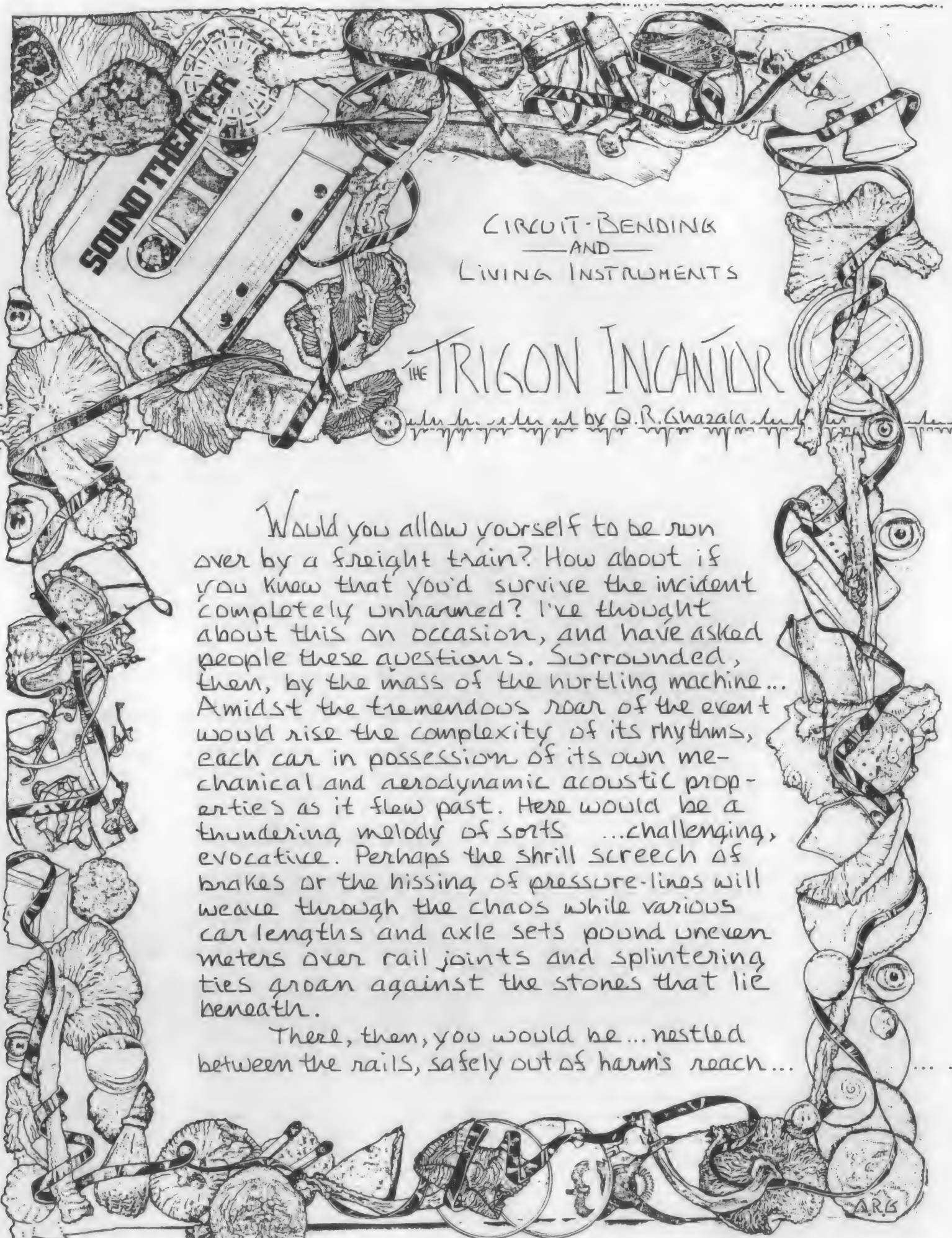
SOURCES FOR GAME & PREDATOR CALLS

Game calls and predator calls are available in most well-supplied sporting goods and in all hunting supply stores – in both urban areas and rural districts. Current addresses for mail-order catalogs can be found in any hunting and/or gun magazine.

For a vast range of game and predator calls, E.J. Sceery and Lohman Manufacturing Company are two companies well-known in the hunting business. (My favorite predator calls are E.J. Sceery's "Desert Camo." They are made of aesthetically-pleasing high-tech rubber and can take punishment.)

For duck calls, Greenhead, Olt and Weems are three favorite brand-names amongst duck hunters (and John Zorn). Some hunters and craftspeople make game calls much like some people make duck decoys, but as with all things "custom-made" expect "custom-made" prices.

Jonathan Y.S. Chang is a musician as well as a poet. He can be reached at 10207 Oak Point Drive, Houston, TX 77043-4221.



CIRCUIT-BENDING —AND— LIVING INSTRUMENTS

THE TRIGON INCANTOR

by Q.R. Ghazala

Would you allow yourself to be run over by a freight train? How about if you knew that you'd survive the incident completely unharmed? I've thought about this on occasion, and have asked people these questions. Surrounded, then, by the mass of the hurtling machine... Amidst the tremendous roar of the event would rise the complexity of its rhythms, each car in possession of its own mechanical and aerodynamic acoustic properties as it flew past. Here would be a thundering melody of sorts ...challenging, evocative. Perhaps the shrill screech of brakes or the hissing of pressure-lines will weave through the chaos while various car lengths and axle sets pound uneven meters over rail joints and splintering ties groan against the stones that lie beneath.

There, then, you would be... nestled between the rails, safely out of harm's reach...

THE TRIGON INCANTOR

By Q. R. Ghazala

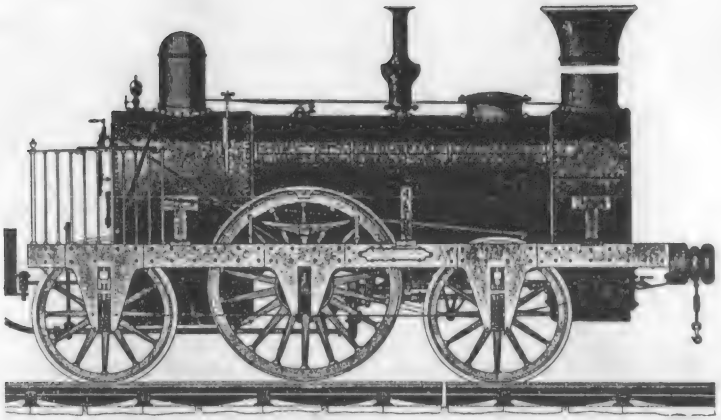
(continued from previous page)

Surely there is art here, both within and beyond the intense auditory experience engulfing the captured listener. In fact, I think there is high art here, replete with all ramifications. Is Bach challenged? Or Partch? Is any school, canon, or composer of music threatened by any such possibility? If fine art is not a dead language, like Latin, used only to restate itself unerringly safe of variation, then where must it go, and upon which giant's shoulders will it stand? To me, more than anything else, this premise evokes the image of a great museum containing many galleries ...some poorly lit, others ablaze and brilliant. There is no challenge here, and fine art is ultimately resolved through the capacity of the observer to perceive the emotional message. The rewards of difficult art then, it may be, depend more upon viewpoint than article (a reassuring thought?), and in the end, the true size of a gallery has more to do with how long one might linger within than the distance between its walls.

I had the two microphones placed about fifteen feet apart, wind-screened, resting between the oily ties, both outside the tracks and pointing at the same rail. As I waited for the train I found myself considering the imaginary experience again: being overwhelmed, safe but helpless, by the sensory event of the engines and cars racing by overhead, as well as the aesthetic implications thereof. I was pondering this relationship between 'art' and 'chaos' when I heard the deep throbbing and turned to see the greasy diesel smoke churning up into the air, rising above the small trees down at the bend in the tracks.

I was at this certain spot for a reason. While hiking the several miles of railway between my house and one of my circuit-bending* parts sources, that being an old brick-and-stone Salvation Army retail outlet, I had discovered an area of tracks where the gravel ballast beneath the ties was wearing low. A loose rail joint, where two long lengths of track meet, was at fault. The Weight expressed by the wheels upon this unstable junction allowed both rail ends to over-flex downwardly, loosening spikes and corresponding ties for a good distance both ways along the two rails up and down the rail bed.

Again, you've probably guessed my interest in this situation. Each rail acted like a musical tine, such as that of a kalimba or tongue drum. In this case, the free ends of the giant steel tines opposed each other, separated only by a small gap. Further away from the gap in each direction, where the rails were increasingly less likely to be forced downward by the weight of the train, the railroad spikes were still tight. This provided each track with a well-secured basis from which to vibrate, similar to the block in a mechanical music box to which the musical tine



set, or comb, is mounted.

These were old tracks, and the train was lurching from side to side as it rounded the bend nearing the microphones and the gap in the rails. In a moment the engine loomed over me. Just as had happened on the hike a day earlier, the most unexpected bell tones began to sweep up and down, mixed with the tumbling clatter of the boxcars as their 'trucks', or wheel assemblies, rolled over the gap in the tracks. As it is in so many musical instruments, here we had a means of shortening or lengthening a vibrating sound source, thereby raising or lowering a pitch. In this case the trucks, equipped with two, three, or four wheels per side, presented audibly as groups of notes rising in approach of the gap and falling thereafter. The wheels played the rails just as you might run a fingertip along the length of a plucked string. Each truck created one main rising or falling note created by the closest wheel in the set to the gap as it approached or retreated from the rail junction. The other wheels in the set provided softer though still discernible pitches as they also neared or left the gap, and briefly became strongly apparent at the gap itself since at that point each wheel had a moment to modify the pitch of a short, but free, vibrating length.

Musical saw, Flexitone, and orchestral chimes moved within the eccentric train rhythms here, providing one of the most interesting railroad sounds I've ever heard.

Whether floating in at night over the distances ...surreal, hypnotic... or humbling the listener close at hand, railroad sounds amidst their clangorous industries have always held a certain fascination for me. Back in high school, friends and I were in the habit of "hopping trains," jumping onto a boxcar ladder and riding across town above the couplers. We'd jump back off at destination or if the train began to accelerate, threatening some unknown long-distance ride. It was just this that happened the evening of another very memorable railroad sound event.

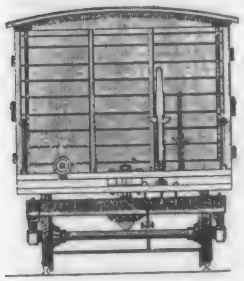
As the train gathered speed, one person in our group refused to jump off, soon finding himself in the next state somewhat disillusioned with rail travel. The two of us that remained had little choice but to begin the long hike homewards with the setting sun reflecting in the encroaching darkness upon the steel rails that disappeared into the horizon.

Towering manufacturing plants occasionally flanked the tracks on the walk back home. Many of these old ivy-covered factories were crumbling even then, though still in heavy production. Replaced now by low corrugated steel sheds housing smaller, simpler machinery, the visual and sonic landscape of the railway has become much less enticing. But on our tramp home, twenty-five years ago, the massive brick buildings roared with gushing steam, and groaned ominously from within as though the tortured giants that they chained and fed were more than senseless machines. At one point we were so amazed at the incredible thickness of the noise, finding ourselves absolutely engulfed in the dense curtain of mechanical sounds, that we sat down on the tracks to pause and marvel at what we heard.

*Circuit-bending refers to the process of creative short-circuiting by which standard audio electronics are radically modified to produce unique experimental instruments. A further description of these techniques can be read in EMI Volume VIII #1, Sept. 1992.

Strips of starry sky replaced the polished rails, as the black of night had come on, and at that time in history factories did not try to reassure stockholders with self-proclaiming lighting systems capable of powering small cities. In the darkness we listened to this tapestry (cacophony?) and followed its shifting layers, looking at each other and smiling when great sounds fell together or new voices arose. Slowly, another sound came on and seemed to grow from all around. Metallic, rhythmic, alluring...it wove in and out of this peculiar recital like a flute might tempt the listener above a wash of strings. We both noticed the rail under us vibrating at the same time. The leading boxcar was only about fifty feet away, showing itself as nothing more than a dim flashing yellow light advancing like a floating ghost between the shuddering tracks. Its noises still disguised in the greater soundscape, the train's outline suddenly appeared as we jumped aside to safety.

Foolhardy? No doubt. But we had never seen an engine *pushing* freight on the main lines before. Over these straight rails an oncoming train's headlight, which we watched for, even in daylight could be noticed miles away. The reality of a train running backwards with nothing more than soot-covered battery-powered blinker to warn of its approach was quite new. Suddenly the wiser, we soon found ourselves doubly glad about the freight's slow speed. Not only did we have time enough to escape its path, but we were also able to hop an empty flatcar, riding in comfort and style most of the way back to the city with the low crescent moon a flirting escort gliding over black water towers and drifting through empty warehouse windows.



So much for railroad stories, and you must be wondering what any of this has to do with the Trigon Incantor. No, the Trigon Incantor does not center around railroad sounds, nor does it offer much threat to the reckless adventurer. Watching the train wheels roll over the musical gap, however, did lead me to the instrument's most unusual aspect... the steel playing-spheres.

Circuit-bending is done, primarily, while the circuit is actively producing sound. The result of exploring the live circuit can be immediately heard and charted in this way. While a radio needs but to be turned on for sound production, a keyboard instrument awaits finger pressure as do many other devices dependent upon the closing of switches for voice articulation. An organ key, for example, can be taped down or held in the down position by means of a folded paper wedge for circuit-bending experiments. Push-button switches can also be taped down. The Trigon Incantor, however, receives its operative triggering not from a musical keyboard or common mechanical switches, but rather from a flat pressure-sensitive 'keypad' divided into thirty-six separate zones. These various zones, as you might picture, cannot be taped down or wedged to produce voices for live circuit exploration. Additionally, for on-going sounds to be heard, pressure upon the keypad must be constant.

Foreseeing these difficulties, I had delayed experimenting with the device and had not really given it more thought. Perhaps a moment of additional consideration would have led me to what the train wheels over the gap so clearly revealed, as simple as the revelation was. The wheels exert their considerable load upon a very small area, that being the wheel-to-rail contact point. Voilà! It's a very short jump from wheels to spheres, and therein lay my all-too-obvious solution for activating the different zones on the pressure-sensitive pad, or stage, as would seem the more appropriate designation once the movable orbs come into play. Of course, while it's true that any weights placed upon the stage will trigger audio streams, the 2" steel balls exert precise pressure for accurate placement within the multi-zone grid, and are easily rolled-about to new positions.

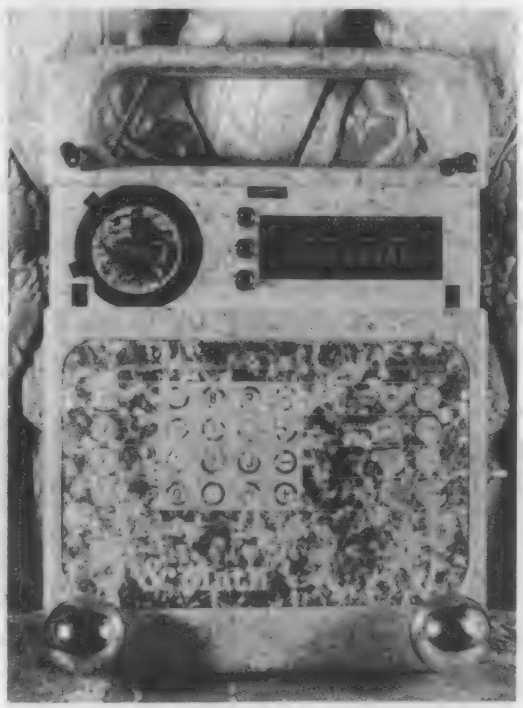
Like my standard Incantor, the Trigon Incantor is a circuit-bent human voice synthesizer. Both devices are capable of producing extremely complex, astoundingly variable sound sequences. Disoriented by the unforeseen pressures of circuit-bending, wildly deranged programs now trigger the voice generators along with, in the Trigon Incantor's case, an ample built-in sound effects bank as well. The resulting patterns are always intricate, always surprising,, and forever capable of producing something new. In these experimental music boxes chance and indeterminacy gloriously reign.

In the June 1993 Vol VIII #6 issue of EMI, I touched upon the history of human voice synthesis and described in detail the behavior of the Incantor. (For a free reprint of that previous article see note at this writing's end). A short overview here will be helpful.

During the early 70s, Texas Instruments began to market an electronic human voice synthesizer in the form of a child's educational toy known as the Speak & Spell. This rather successful, and at the time quite novel, device spawned two additional toys. These were the Speak & Read and the Speak & Math. Looking about the same, all offered a number of games in which a synthetic voice requests a specific keypad entry from the child. It's possible to build Incantors from all three.

Texas Instruments, inspired with the very positive reception of these talking toys, began to develop similar voice synthesizers for both younger and older children. The Super Speak & Spell appeared for kids who outgrew the earlier model, and to address the lesser experience and dexterity of younger children a larger human voice synthesizer was created. Here the oversized keypad took the form of a colorful page of pictures. Certainly due a Silly Name Award, this speaking computer was marketed as the Touch & Tell. Trigon Incantors are made from these.

Whereas the Speak & Spell might say "Can you spell the word CAT?", the Touch & Tell would simply prompt "Can you find the cat? Press a picture!" In the first example a series of small alphabet 'keys' would need to be accurately pressed. In the second example, just pressing a picture of a cat would suffice. Further, the Touch & Tell's picture sheets are interchangeable. Each displays a variable number of images and is hole-punched along the edge so as to reset hidden switches when located in place. In this way, alternate switch



STANDARD INCANTOR. Early model with stationary body-contacts at bottom.

settings program the synthesizer's computer relative to each picture sheet. Although regarded as toys, the only thing childish about these curious talking boxes is their vocabulary. But with circuit-bending ...

The principles of chance when applied to electronic sound synthesis have a history of producing rather intriguing results. Frequency range, tone color, and the very flexible envelope of the synthesizer's voice add up to a versatility that can be downright stunning when influenced by randomized controlling factors. So yes, Incantors are music boxes... experimental music boxes employing these principles with the addition of human voice artifacts thrown in. Both frequency and dynamic range are impressive, especially apparent when monitored through the line output feeding a good amp or full sound system. My enthusiasm, I've discovered, is shared now by Incantor owners everywhere. From stage use for large audiences to simply sitting alone with one on the lap, reports of amazement are always coming in. Honestly, I can't say that I'm surprised.

Why? The reason I'm not surprised is that, like myself, untold thousands of other people have become familiar enough with the usual synthesis techniques to have grown a little weary of these clinical, this-is-how-it works, prediction = theory = prediction practices. Even with a deluge of random/pseudo randoms on the rampage, these are still applied to normalized systems. With circuit-bending, controlling factors are applied to *non-normalized* systems, their rational operative theories having fled long before, piling up underfoot in the shadows of my workbench.

Actually, what I've done to the device is relatively simple, and I can't take much credit for the Incantor's wondrous eccentricity. I've kicked over a tiny stone and it has triggered an avalanche. The instrument's innate abilities are its true lifeblood. I've only driven it mad and, liking what it said, lingered to listen.

Don't get me wrong... I've spent time in electronic music labs, I've sat at the keyboards of fine synthesizers, I've built computer-jiggled polyphonic contraptions, and have had before me countless theory-true gizmos. I adored them all.

Above: TRIGON INCANTOR with 2" steel balls upon pressure-sensitive stage.

Below left: CIRCUIT-BENT JUNGLE SAMPLES. The playing spheres are an ancient American Indian gaming ball and a large glass marble.

Below right: CIRCUIT-BENT HUMAN (CARTOON) VOICE SYNTHESIZER. Playing spheres: Civil War cannonball, rutilated quartz; large hollow bronze, 2" steel.

The Incantor, or circuit-bending in general, simply adds a new and novel *voice system* to the world of music. This is what people recognize, and why I'm not surprised by the enthusiasm so often expressed. The unusual demands placed upon the musician who must address a non-linear instrument in a non-linear manner represent a challenge that I, and many others I find, openly welcome.

With voice characteristics being primarily the same, the standard and Trigon Incantor differ mainly in the playing techniques. Both are capable of producing short as well as on-going streams of finely delineated digital sounds. These sounds, which range from percussive to melodic to vocal, and are constantly re-evolving through abstraction after abstraction, can be initiated on each instrument through various data entries involving the new circuit-bending switches as well as standard keypad actuation.

Both Incantors have pitch/speed controls which slow down the digital surges of information, exposing whole worlds of new sounds. As the pitch/speed is decreased, falling frequencies rattle the windows and drop out of hearing range while fresh high-pitched voices float in from the top ... always changing, always cycling. In this way the texture, or 'grain,' of the signal is exposed and the strange sonic building blocks become remarkably evident. Each Incantor includes voice bending switches; three for the standard Incantor and five for the Trigon. These activate the added circuitry creating the wild voice transmutations, and are at the heart of the bending. Body-contacts appear on both as well. Like the rotary pitch control, these conductive metal knobs also affect frequency when in communication with the flesh. Though they do not move, varying finger pressure acts upon the instrument's voice in a way similar to a synthesizer's pitch-bend wheel, or a guitar's tremolo bar. Both Incantors also include custom reset switches, fluctuating envelope LEDs, and accept the original expansion modules manufactured by Texas Instruments.

How the voices are looped represents the main difference between the standard and the Trigon Incantor. The looping system on the standard Incantor consists of four separate controls: a momentary or 'loop search' push-button, a toggle switch for 'loop hold,' an electric eye for shadow control of loop sequencing, and an on-off switch to activate this eye. In comparison, all of this is accomplished on the Trigon Incantor by placement on the pressure-sensitive stage of the heavy steel balls. One, two, or all three balls can be used for setting loops (non-continuous voices are triggered by momentary finger-pressure on the stage). Incantor looping presents very unusual, strangely varying rhythmic structures unlike those from any other source I've ever heard. And loops, of course, can be slowed down in the same way as all Incantor voices with the same peculiar sonic results. Dramatic pitch sweeps, unique percussive bursts, disarrayed phonemes,

extraordinary note sequences, surrealistic wordings, and intriguing tone colors all combine here in a sensuous panoply of sound.

Incantor finishes vary depending upon color layerings, veinings, 'crackle' coatings, etc., and I'm often asked to produce specific combinations to satisfy individual preferences. Most that I've built lately have been rich, flat, fluorescent green with bright gold marbling. Not as garish as it may sound, to me this coloration suggests an otherworldly malachite of sorts. Iridescent "scorpion skin," found in a plastics shop in NYC's Chinatown, covers the Trigon Incantor's stage. This purple/green, and all-colors-in-between, highly textured surface plainly states that something inordinate is going on, and does a fine job (its main benefit actually) of keeping the steel orbs in place.

Two more instruments have resulted from the weight-as-controller idea (see photos). Each contains circuit-binding alterations which, as usual, open new sonic and operative possibilities. The larger of these contains another human voice synthesizer; the smaller one samples of jungle-sounds. Speed controls and looping systems perform as in Incantors. With speed turned way down and creeping at a snail's pace, the jungle sounds are turned into undulating percussive bursts with shifting harmonics, sometimes pausing minutes between vocalizations. When this signal is fed to an amp with a touch of reverb and sharpened with a little EQ, an unpredictable and very listenable 'rhythm section' is created.

Because I'm thrilled with discovery, I'm thrilled not knowing things. I love the mystery inherent in ignorance. I *don't* want to know everything. I want to be *befuddled*...

Sometimes I wonder if readers of this series of articles feel that I am unappreciative of acoustic instruments. Nothing could be further from the truth. I'm always searching for building, or modifying acoustic instruments as well as electronic. The last time a reporter asked the size of the acoustic collection, I gave up counting a little past three hundred. That's before I searched through closets, the basement, and the workshop out back.

Here's a recent example... My old upright piano now has four pedals. The one on the far left, the new one fashioned from a nice brass andiron and extending out of a one-inch round hole, is attached to what I'm calling a harmonic mute. From the pedal a cable runs up to retracted damping bar (edged with a strip of firm foam rubber) that is brought against the piano's course of bass strings when activated. The bar is hinged to the wood just under the keys but inside the case, and is spring-held toward this surface. Pedal pressure brings the harmonic mute against the strings with a controllable force from slight to very strong, providing usable effects across this entire range.

Positioned to intersect the center of the strings' lengths so as to bring out the second harmonics, this mute acts upon the string's behavior in the same way as the more familiar example of harmonics production on the guitar: strumming while a finger gently rests upon the strings at various points to elicit ringing harmonic overtones. In the piano, the sound of these second partials blooms immediately after the now-muted voice of the fundamental is heard. With the piano's forte pedal held down, and all the strings free to vibrate, these singing harmonics swell into metallic dissonance as the sympathetic chorus builds, and suddenly the instrument has a fascinating new voice. When only the newly muted bass course is played, the piano becomes a carillon-like instrument with bell tones very prominent If the entire keyboard is played while varying pressure is applied to the harmonic mute, an electronic ring modulator sound is created. Cage's prepared pianos come to mind, though here the novel voices can be instantly had or done away with.

But as I said, I want to be befuddled ... I want musical discoveries that make the head spin ... The time I've worked designing experimental acoustic instruments has always been time well-spent. I absolutely appreciate the richness of the acoustic instrument's voice, and fully understand the rationale that holds the electronic instrument's voice to be the lesser. Still, I can't say that I have a favorite. I'm equally inspired to search in each field. Voices thick or thin, ugly or beautiful, it no longer makes a difference. What matters is simply their emotional content, how you hear them, or, from the composer's point of view, how they are organized.

However, what I'm getting at is that I'm much more likely to accurately foresee the sonic result of an acoustic experiment than an experiment of circuit-bending. The great discovery threshold with electronics can be closer at hand, it seems, and the possibility of revealing startling new voices to work with is always enticing.

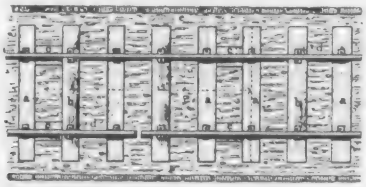
I know I'm in hot water, so let me turn up the flame. New voices present new challenges, force new ideas, and often inspire new music. Because circuit-bending carries this great promise of a unique voice-production system, and because circuit-bending is open to everyone, requiring only a bare minimum of technical skills (unlike much acoustic instrument construction), and because practically *every electronic audio device in existence* is a new voice waiting to happen, it's hard not to think that circuit-bending may be one of the most significant fields of experimental musical instrument design to ever have come about. It has befuddled, challenged, and inspired me without relent for nearly as long as I can remember. Circuit-bending has forced me to consider and compose some of the most "uncategorizable" (recurring theme of written music reviews for over two decades) music around. It's truly captivating once begun, terribly fun, and downright exhilarating at times, which I know is something all instrument builders can appreciate. So yes, consider taking that hike down to the secondhand shop and

HARMONIC MUTE SYSTEM. Rough, but adjustable, sturdy, and silent. (The photo on the right is the view looking up from the pedals.

spending a day building an Incantor. With a little luck, it may be the first of many such experiments to come.

Not only does the observed wheel pressure over the railway's musical gap connect with the Trigon Incantor. More importantly, the proposed chaos of the sound storm all around, as the engine and freight cars safely careen over you, connects as well. The circuit-bent instrument contains a similar chaos also rich with emotional potential, though much more tangible, perhaps, when rendered as a musical voice I've grown to suspect that non-normalized electronics hide *vast* secrets... secrets far, far beyond the current "fuzzy logic" technologies beginning to drift toward that direction. Perhaps fuzzy logic will lead to *clear illogic* systems where uncertainty will be augmented rather than merely analyzed. My guess is that a whole new field of electronics is being born, where out of the realm of light and sound leaps *chance*, its art now alive in a world of silent darkness, in labyrinths of energy invisible, profound. And while I'm not completely sure if Incantors themselves contain this clear illogic, I won't blame anyone suspecting that a bit has rubbed off on me.

Shhhhhh ... listen! Did you hear that? I think a train is coming ...



Engravings modified by Q.R. Ghazala. Based upon work by H. Winkles and Gust. Feldroeg from **The Complete Encyclopedia of Illustration**, by J.G. Heck, Park Lane, NY, 1979.

Further information about talking machines can be found in R. Linggard's fascinating book **Electronic Synthesis of Speech** published by Cambridge University Press, as well as Nelson Morgan's **Talking Chips** published by McGraw-Hill.

There is a Secret Garden, the 60 min. cassette release created entirely with standard Incantors and reviewed in EMI Vol VIII #6, June 1993, is obtainable by writing to Reed Ghazala at SOUND THEATER, ECHO 241, 7672 Montgomery Rd., Cincinnati, OH 45236, USA. Price is $8.00 including shipping and handling.

The Trigon Incantor can be heard on Ghazala's newest recording, **Three Rings on the Ground**, available through Pointless Music, 1889 Algonquin, Kent, OH 44240, USA.

Q.R. Ghazala has on hand a small supply of Touch & Tells and associated parts for building Trigon Incantors. Price is the same as standard Incantors, $240, again reflecting only supply costs and hourly bench fee at usual repair shop rates.

For a free reprint of Ghazala's earlier article on Incantors send a S.A.S.E. to the above SOUND THEATER address.

—-A SPECIAL NOTE FROM REED—

CALLING ALL CIRCUIT-BENDERS! I am considering the possibility of creating a unique boxed set of documentation dedicated to the subject of experimental musical instruments and experimental music created by the re-wiring of standard audio circuits. To illustrate the unusual sounds, construction, and playing techniques of 'circuit-bending', a book/CD/video package is now in discussion. My feeling is that the project should take the form of an eclectic gallery featuring the instruments of various builders worldwide. The success of this endeavor will therefore highly depend upon the contributors' input. While every little bit of information will be appreciated, I would especially encourage designers to send a package consisting of photos, recordings, written opinions, personal portrait, and video, if possible, of the instrument(s) in use. Please send materials that may be kept on file to Reed Ghazala at the Sound Theater address listed above.

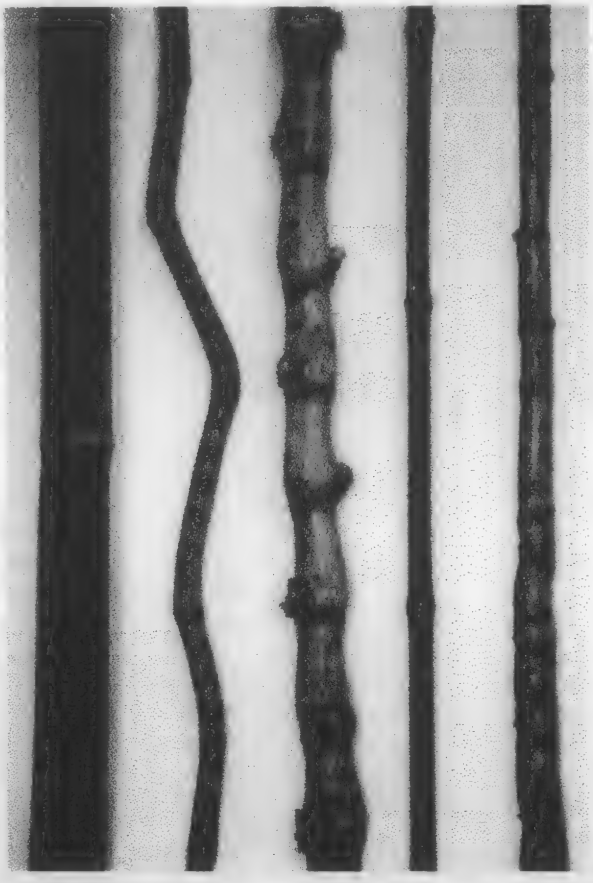
BAMBOO: The Giant Musical Grass

By Richard Waters

An overview of this versatile plant as it applies to instrument design and sound:
How to select, grow, harvest, and utilize bamboo.

This is the second of three articles on bamboo by Richard Waters, instrument maker and bamboo cultivator. In the first part, appearing in EMI's last issue (Volume 10 #3, March 1995), he discussed available bamboo species and their characteristics. In this second installment he covers bamboo cultivation. The third, to appear next issue, will focus on musical uses.

Part 2: GROWING AND HARVESTING BAMBOO



In the last article we briefly reviewed various bamboos and their suitability to the different temperature ranges. In this section we will examine optimum growing conditions, propagation and ways of harvesting and curing. Being a giant grass makes bamboo a heavy feeder, and if you are interested in maximum growth, attention must be paid to fertilizers and the *quality and quantity* of water that bamboos receive. As stated in the last article, bamboos are sensitive to sodium so this means no fish emulsion or other ocean-derived products such as seaweed or oyster shell grit. (The latter is often fed to poultry, so poultry manures are suspect of high sodium. So are many other animal manures, especially horse, due to salt blocks and food additives.) As many bamboos are sensitive to lime, do not use poultry manure, nor mushroom compost. If you are knowledgeable about the source being sodium free then you can use either horse or steer or other manures mixed into some top soil. Otherwise let all animal manures compost for a few months until the sodium has had a chance to be leached away by rain. If you live in an area where composting animal manures is difficult then consider cottonseed meal or rabbit manure (odorless). Chemical fertilizers have a tendency to burn and move through the soil too fast to be of much value unless they are the time-release type (expensive) or are applied in small amounts frequently. Two of the time-release chemical fertilizers are *Osmacoat* and *Wood Ace*. Whichever fertilizer you use you should be feeding a fertilizer that is high in nitrogen and the NPK. (nitrogen, phosphorus, potassium) should be something like 12- 6- 5 or 14-6-10. Stay away from the all big numbers like 20-20-20 or 20-5-10 as they may burn your plants. Organic fertilizers are sometimes not rated with NPK but usually horse and steer manures would be in the 5-3-2 range, plus these manures contain fibrous materials which bamboos like. If you have access to leaves or other organic waste (leather/feather scrap, hair from your barber, fresh water fish scrap, etc.) this material can be dug into the soil to enrich it. If you want optimum culm production feed your bamboos a lot of fertilizer before and during the shooting period. Do not feed tropical bamboos until spring or warm weather. Ph is an agricultural term that has to do with acidity/alkalinity in the soil. Most bamboos like a slightly acid soil, say between 5.5 and 6.5. If the soil becomes alkaline then many of the nutrients and micro-nutrients are tied up in the soil and are not available to bamboos. Most bamboos revolt at lime but an exception to this is *Otatea a. aztecorum* (Mexican Weeping Bamboo), which overgrows limestone in Mexico. This is the only bamboo I know that likes lime and alkaline conditions, plus it is also a little drought tolerant. Alkaline soil can be made acid by the addition of sulfur, blood meal, cottenseed meal, leaves/bark and compost. If maximum growth is desirable then put your bamboo into as large a hole as you can possibly dig with a lot of room/food/moisture. If you are planting a potted bamboo it is a matter of putting the plant into the hole and covering with soil/fertilizer/mulch and then watering, which is a fairly simple process. Oxygen is important so fast drainage is necessary.

PROPAGATING BAMBOO

Seeds, *rhizomes*, and *divisions* are the easiest methods of propagating bamboos. There are other methods – culm sections and air layering (clumping bamboos only) and tissue culture – but these are more difficult and will not be considered in this article.

Timing, Planning, Tools: Cold-hardy varieties like *Phyllostachys* are usually divided during winter while the tropical bamboos like *Bambusa* are divided in spring-summer. This is not to say that a division cannot be made at another time but the success rate is much higher if they are divided just before they begin their major shooting period. If possible when dividing pick rainy, foggy or overcast days – mornings are optimum followed by late afternoons. If you are dividing a grove of medium to large bamboos then you will need a good shovel and an ax. Some additional equipment may be needed like lopers (big pruners) or a machete, and a pruning saw for cutting away unwanted growth and those culms you are not hauling. A mattox or pick-ax is sometimes useful as is a steel bar like the ones used for breaking hardpan clay. If you are doing a lot of dividing of bamboo then equip yourself accordingly. Sharp tools will speed the process, which can be exhausting depending on the site and volume of material to be divided and moved. Additional materials that assist are plastic tarps and ropes for covering and tying the bamboos to protect them from wind/sun exposure during the trip home; otherwise they will arrive in a state of extreme dehydration and will most likely defoliate. If you cannot divide during a rainy period it helps to spray the bamboos with water prior to wrapping them for their journey. A red flag for your extended load is advised. If you do not have access to a truck or trailer the culms may be topped out for easier car hauling but this is not recommended from a visual standpoint.

Dividing bamboo: If you are taking single culms make sure the attached rhizome has at least one or more buds on it, as the bamboo will not shoot nor multiply without at least one viable bud. Dig around the sections you want with the shovel and use the steel bar or ax to sever any rhizomes. Then take the steel bar and drive it under the section and use it like a large pry bar. Do this from several angles and the section will usually pop out of the ground.

Planting new divisions quickly before they start to dehydrate is helpful. Place the bamboo in the hole while orienting the leaves toward the noonday sun, cover with your improved planting mix, then flood the hole with water and spray the leaves.. The addition of micro-nutrients is helpful so I use a product called "Superthrive" which contains these essential elements. If it is a windy site and your bamboo is tall you will need to stake and tie it, and if you are moving newly divided bamboo into a site that is full sun and/or windy it helps to erect some sort of sun/wind break out of plastic, cloth or branches. Otherwise newly divided bamboos have a hard time getting enough water up to their leaves and will often defoliate. If this happens do not despair. Make sure the root systems have moisture on a regular basis. If there is no rain during the first 2-3 weeks a rinse in the morning and late afternoon is advised. After that water just in the mornings for the next week or so. Watch the leaves as the new growth will tell what is happening to the bamboo. Sometimes after defoliating a bamboo will not put out new leaves but will instead send up a new shoot which will take a month or more to leaf out. For better moisture protection with new divisions I sometimes will pot-up the divisions in containers so I can grow them in a shaded, protected spot for a month or two prior to putting them in the ground.

Rhizome divisions: You may also opt for rhizomes alone without the culms attached. A piece of rhizome can be severed from the grove and dug from the ground. Make sure there are at least *2 buds* on the rhizome. These will be creamy colored protrusions indicating a potential new shoot. Running bamboo rhizomes are easier to dig than clumping as the latter will be in one tight area rather than spread out as with running bamboos. If you dig a large section of a running rhizome you can cut it into short sections as long as each section has *two buds* on it. Plant these rhizome sections 2 to 4 inches below the surface, horizontally in the planting mix with the buds pointing up, and keep moist (not soaking wet as they can rot). These rhizome starts should shoot from either one or both of the buds. This rhizome starting method is one of the easier ways to obtain bamboos as it does not require the extensive digging process required of moving rhizomes and culms attached, plus there are no leaves to worry about and hauling rhizomes is a fairly simple process. Keep them moist and covered until planting, which should be done as soon as possible.

Seeds: This is the easiest method of getting starts of bamboos provided you have access to the seeds. Networking via the *American Bamboo Society* is probably the best way to obtain seeds as bamboos do not flower and set seed very often. Some bamboos never set seed and must be propagated by some of the other methods described here. By staying in touch with the A.B.S. you will be able to find out which bamboos are flowering where and who you might contact. Bamboo seed is sprouted just like other seed by planting them in a low-sodium starter mix at twice the depth of the thickness of the seed. Keep moist and not in direct sunlight and out of the wind.

WATER AND BAMBOO

Many areas in the U.S. have enough rain to sustain bamboos, while in other areas of the west rain is in short supply, so some type of irrigation is necessary. And it is not only the quantity of water but also the quality of it that can be a problem for bamboos. There are two things that bamboos do not like – *sodium* and *chlorine*.

I mentioned earlier in the fertilizer section about sodium, which creeps into the planting mix via ocean-derived fertilizers and animal manures. Water can add even more sodium, which can accumulate around bamboos in areas with low rainfall. If you live where you have a *salt rinse* for your water conditioner, make sure that the garden water comes off the line prior to salt rinse. Bamboos that get too much sodium have scorched leaves at the beginning followed by defoliation if the high sodium problem is not corrected. Sodium build-up in the soil can be reduced by catching rainwater during the rainy months and using buckets to flush sodium from the bamboos. I cut 55 gallon plastic drums in half and place them under my downspouts to collect rainwater. When I see a bamboo that is showing leaf burn and I suspect sodium build-up, I flush that plant with several buckets of Mother Nature's solution. Good drainage is a must as bamboos will not grow in a bog or swamp. If you have such a location then plant in a raised bed to ensure good drainage, or plant in containers.

Chlorine is another problem which is usually a little easier to deal with. Reducing the chlorine at the injection point is a good idea if you have access to the water supply. If you are using chlorinated water on your bamboos be sure to use *mist* or *spray* emitters rather than the drip or soaker emitters as this will allow the majority of the chlorine to dissipate in the air. If you have a choice, *rainwater* is always better than ground water or treated water.

Fifty inches of rain (or drip and rain) per year would be a minimum amount of water for most bamboos. 100+ inches or more would be better for big rapid growth. This is assuming drainage is good and sufficient water and fertilizers are available before and during their major growth period.

Bamboos are basically very easy to grow. Even if you do not follow all of this detailed information your bamboo will probably grow anyhow. The above details are to assure rapid and healthy growth within a minimum time period. Bamboos are fast growers and these measures will make them even faster. Plants are like people – treat them right by giving them enough of the right nourishment in a good environment and you will see very positive results.

I assume that not all of you have the space nor time to grow

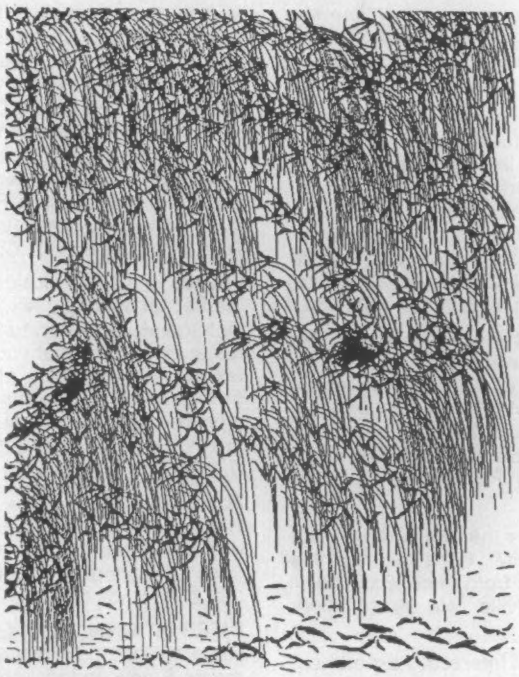
Bamboo species shown on page 39 left to right: P. bambusoides, P. aureosulcata, B. Ventricosa, P. nigra, P. aurea.

Graphics for this article by Richard Waters.

your own bamboo but would like to acquire culms for your musical projects. Many of the nurseries listed with the A.B.S. do offer culms for sale. Aside from contacting the A.B.S. for their source list there are other ways of obtaining culms. Sometimes you can find a free source. As you drive in your area and spot a grove of bamboo, inquire as to who the owner is and asked them if you can thin a few of the culms. Or run a small ad in the garden section of the classified ads: "Bamboo Wanted" or "Will pay $ for bamboo" with your phone number. You may be surprised with the response. Sometimes you can find perfect (no checks or cracks) culms that have cured out in the standing position and all you have to do is harvest and debranch them. Some timber bamboo owners want money for their culms. $10 per culm for a large timber bamboo would be within reason, especially if it has been cured properly. If you are lucky enough to find a free source of either plants or culms, be sure to fill in the digging holes and clean up any debris you create so that you or the next person seeking culms will be welcome there.

HARVESTING.

For quality culms bamboos are harvested between the 3rd year through the 5th year. Culms that are less that 3 years old have not matured and the wood is much softer, thicker and subject to excessive shrinkage and other imperfections. In order to speed the drying process, harvesting is best done during a dry period in late summer or early fall. Use a coarse-tooth pruning saw and sever the culm as close to the ground as possible. If you want the section below where it comes out of the ground you will need to dig and cut the culm from the rhizome where it is attached. This is the section of the culm that is most prized by those that make Shakuhachi flutes (*Phyllostachys* genus only).



CURING

After harvesting green culms you will need a space that is dry, has good ventilation, and is out of the sun where temperatures do not soar to extremes. Culms that are dried in the sun crack and become useless for most instrument designs. (Cracked culms may be split further for use as mallet shafts, etc.) I use the underside of my studio, where it well ventilated and I can inspect the culms on a regular basis. Usually culms are de-branched prior to the drying process, but debranching slows the drying process so if you have enough space leave the branches on. I remember when I was a boy making fishing poles from P. *aurea* an alternate way of vertically curing the culms: After harvesting the culms fasten a stiff wire hook on one end of the culm and hang from a barn or eave rafter or other dry spot. On the large end of the culm tie a piece of cord and hang a one-gallon jug full of water. The weight of the water will cause the vertical culm to dry perfectly straight – especially the small end which otherwise tends to have a curve or bend to it. Depending on how much water the culm contains, humidity, heat, ventilation and the size of the culm, it will take between three months to a year to properly cure. Slowly the green or yellow of the culms will give way to a tan or brown color. When this is complete the culm will be much lighter in weight and will be cured.

BUGS

In some areas if you do take prompt action the bugs will convert your beautiful culms into a useless mess. The worst pest is the *Post Powder Beetle,* which is very destructive and attacks most varieties of bamboo after they are cured. This beetle also attacks Redwood, Cypress, and Mango, and Baywood (Myrtle) to name a few. If bugs are a serious problem, preventative treatment can begin as soon as the green culms are harvested, but usually culms are treated after curing. There are numerous products that will do but choose wisely as not all products give the same result. The most traditional and popular are solutions containing Borax. Check with your local chemical company. U.S. Borax markets one such product called "TIM-BOR" -$3.50 per lb. (one lb. makes 1 gallon). Compared to other products that I know of Borax is the safest and best. However, care must be taken as ingestion creates diarrhea and breathing dust or sawdust could be very dangerous. Borax dehydrates pests rather than poisoning them. It only controls the bugs and some fungi and does little in the way of preserving the culms against moisture, so you may want to also use a sealer. Check the labels on preservers/sealers to make sure you feel safe in working with them, as many contain toxic substances such as copper, arsenic, and formaldehyde. When creating dust/sawdust from treated bamboo wear a respirator. Perhaps the best answer to all of this is to cure culms and immediately utilize, then treat if necessary, and possibly seal. (It is not a good idea to treat wind instruments with Borax or poisons). Use natural oils when possible. They are satisfactory in low humidity but not wet/dry cycles (outdoor use) or in other parts of the country where humidity is high. Most natural oils tend to mildew in high humidity, promoting rot and decay. In some third world countries used (spent) diesel oil is applied as protection with success, but is not exactly environmentally safe. A slow process of smoking the culms over a fire or cookstove is also used successfully in third world countries. I suspect that a combination of Eucalyptus, Walnut, and/or Neem tree oils would protect bamboo from bugs and fungi but have no further information on this. Among commercial wood preservatives, Watco™ Marine Teak Oil seems effective in protecting bamboo that will remain outdoors. If you do find an infestation of Post Powder Beetles or other bugs in a culm, immediately destroy by burning or they will infest all of your cured bamboo.

In part three of this article, set to appear in the next issue of *EMI*, we will explore the tools, how to work and how to make a musical device using this great, renewable, versatile resource, *bamboo.*

Any readers who are working with bamboo are invited to share information on oils/finishes and culm protection. Write to EMI at PO Box 784, Nicasio, CA 94946. Or write to author Richard Waters. He can be reached at 1462 Darby Rd., Sebastopol, CA 95472 before June 15; PO Box 1076, Pahoa, HI 96778 after June 15; or through America On Line at Bamboomuse@AOL..COM anytime.

NOTICES

Among the casualties of the Kobe earthquake was XEBEC, a sound showroom which had since 1989 presented concerts and installations by sound artists from Japan and around the world. For XEBEC to continue in a new or rebuilt venue, it will require support both locally and from abroad. If you can help financially or otherwise, contact Nobuhisa Shimoda, 5-2 # B-307, Kashinodai, Nishi-ku, Kobe, 651-22 Japan, or fax 81 78-992-8460 (att. B-307 Shimoda). [10-4]

Earthshaking Percussion: Djembe, Talking Drums, Didjeridu, Dumbeks, Typan, Frame Drums, Surdo, Pandiero, Tabla, Cajons, Clave, Angklung, Balafons, Clay Pot Drums, Kanjira, Bodhran, Sitar, Harmonium, Shekere, Slit Drums, Caxixi and much more. Call (404) 624-3e349 for free catalog & color photos! [10-4]

I make a variety of unprecedented electric kalimbas, paperback sized, solid-body bass rumba boxes, Indonesian pentatonic phase pulsars, and the amazing "Graphic Buzzalizer," that turns anyone into Jimi Hendrix! Info & prices — Generalissimo Kalimba, 535 SE 70th, Portland, OR 97215. [10-4]

The Just Intonation Network has opened a site on the World Wide Web. The URL (Universal Resource Locator) is http://www.dnai.com~jinetwk. The first version of the JIN web site includes introductory literature on just intonation and the network, a catalog for the Just Intonation "Store," index of articles from the network's journal **1/1**, and the introductory chapter from **The Just Intonation Primer** by David Doty. [10-4]

Nexus Foundation for Today's Art is seeking works for an exhibition entitled **Innovative Instruments**, scheduled for June 30 through July 28, 1995, featuring sculptural exhibits by artists, as well as performances and videos. It is presented in conjunction with a city-wide John Cage festival coordinated by the Phildelphia Museum of Art. Interested artists are requested to send slides and/or videos, resume, and SASE to Innovatinve Instruments Curator, Nexus Foundation for Today's Art, 137 N. 2nd St., Philadelphia, PA 19106.Inquiries may be directed to Anne Raman at (215) 629-1103.[10-4]

CALL FOR PHOTOS: Lincoln Center Out-of-Doors will present a one-day festival of Musical Inventions, with performances, workshops and installations. We would like to include as many people and homemade instruments as possible. Due to budget limitations, most of the instruments can only be represented as photographs. If you would like your photos included in the show, please send them with a SASE to Jenneth Webster, Lincoln Center Out-of Doors, 70 Lincoln Center Plaza, New York, NY 10023.[10-4]

For sale: One set of 27 Deagan chimes. These are the rare and beautiful chimes extensively described in recent articles in EMI. For a picture of this particular set, the pictures in this issue's "Notes from Here and There" section. Sandi Ausland, 787 Mahoney Rd., Colville, WA 99114; (509) 684-3652. [10-4]

Senior Thesis Sound Installation — Environment of interactive experimental acoustic sound sources — presence-initiated automatics, harmonics, chaotics, deep listening points, and feedback. May 25-June 10, fourth floor gallery, Evergreen State College, Olympia, WA. Info: James Coury, (360) 943-3984. [10-4]

The Pauline Oliveros Foundation announces its 5th Annual Deep Listening Retreat with composer Pauline Oliveros and special guest, T'ai Chi, Taoist and creative movement specialist Heloise Gold, June 18-23, 1995 at the Rose Mountain Retreat Center in the Sangre de Christo Mountains of New Mexico. The training is designed to meditatively explore listening and sounding. For more information contact the Pauline Oliveros Foundation at (914) 338-5984. [10-4]

Build a custom MIDI Controller/Instrument in one night! — PAVO introduces the MIDItools Custom Instrument Kit, allowing you to create a one-of-a-kind MIDI controller. More information: PAVO, 10 S. Front St., Philadelphia, PA 19106, USA; (215) 413-2355. [10-4]

The American Bamboo Society is sponsoring the formation of a national slide registry of artists, craftspeople, and musicians who work in or with bamboo as a primary medium. From this slide registry individuals will be invited to do one or more of the following: exhibit, demonstrate, hold workshops, perform. Sites will be across the continent and Hawaii sponsored by the American Bamboo Society and other organizations involved with the uses of bamboo. The archival slide registry will be open to craftspeople, installation & performance artists, musicians, painters, and sculptors. Deadline June 1. No fee. On behalf of the A.B.S. are jurors Reuben Weinzveg and Richard Waters. Send 6 slides, and/or video or audio cassette, a resumé, marketing materials/catalog, and S.A.S.E. to Arts & Crafts Coordinator, American Bamboo Society, 321 South Main St. Suite 508, Sebastopol, CA 95472. [10-4]

Having made their living solely on the performance of their multimedia concerts, installations and lecture/demonstrations for the past eleven years as The McLean Mix, Barton and Priscilla McLean are announcing for the first time a tour bringing them to all parts of the continental USA during the winter-spring 1996 season with a choice of 17 different programs. Call Barton at (518) 658-3595 for info. [10-4]

Special Session on Acoustic Ecology at the meeting of the Acoustical Society of America, Ramada Techworld, Washington, DC, May 31-June 4, 1995. Presented by the World Forum for Acoustic Ecology and the Acoustical Society of America. For information contact Fred Lipsett, 37 Oriole Drive, Gloucester, Ont., K1J 7E8, Canada; phone (613) 746-3507. [10-3]

Incantors — Q.R. Ghazala has recently bought out another small inventory of brand new and increasingly rare Texas Instrument Speak & Maths. These devices are the heart of the most deluxe and best sounding incantors to date. Price is $240 (reflecting only parts plus bench fee at repair shop hourly rates). Finished instruments are fluorescent green and gold. Controls include looping, speed/pitch dial, milk glass and brass electric eye (sequences loops with a wave of the hand), body-contacts for inter-flesh modulation, envelope LED, three voice-bending switches and reset switch. All incantors include blue fluorescent alpha-numeric display, monitor speaker, line output, custom patch cord, and instruction sheet. Amazement guaranteed. Owners consider the INCANTOR to be the ultimate experimental music box. For more information, see the INCANTORS article in EMI Vol VIII #6, June 1993, or write to Reed at Sound Theater, Echo 241, 7672 Montgomery Rd., Cincinnati, OH 45236, USA. [10-3]

Sounds of Ethnic Musical Instruments by Telephone / Information on Traditional Music by fax. Anyone with a phone can hear the sounds of instruments from around the world. Call just to listen or to shop by sound for an instrument that you are interested in. Receive free information by fax about taking care of various musical instruments, interviews with musicians, instrument tunings, items that Lark offers, and other interesting articles. Available 24 hours a day; LarkInfo (707) 964-3762, from Lark in the Morning (707) 964-5569. [10-3]

WHEN THE EARTH WAS LIKE NEW: Songs & Stories of the Western Apache, a book and tape set by Chesley Goseyun Wilson, Ruth Longcor-Harnisch Wilson and Bryan Burton, is soon to be available. Included, along with a wealth of other cultural information, are recordings of and instructions for making the Apache violin. Available from Chesley & Ruth Wilson, 333 S. Alvernon Cnd 60, Tucson AZ 85711. 10-2]

INTERNATIONAL SYMPOSIUM ON MUSICAL ACOUSTICS '95 will take place at Dourdon (Paris area), July 2-6, 1995. Main themes: New instruments & new sounds; scientific research with application to instrument making. For information: ISMA '95 Secretariat, c/o Rene Causse, IRCAM, 1 Place Igor Stravinsky, 75004 Paris, France; tel. (33 1) 44 78 47 60; fax (33 1) 42 77 29 47; email: isma@ircam.fr. [10-2]

ELSEWHERES: The electroacoustic music of Hal Rammel. A CD of new recordings on the electroacoustic sound palette, designed and built by Hal Rammel. Contact Penumbra Music, PO Box 282, Grafton WI 53204 USA. 10-2]

A new book by Bart Hopkin, editor of Experimental Musical Instruments, has just been published by Lark Books. **Making Simple Musical Instruments: A Melodious Collection of Strings, Winds, Drums & More** is a collection of plans for home-buildable musical instrument, ranging in difficulty from simple to moderate. The people at Lark books did a wonderful job with the graphic design, layout and printing for this book. The approach is not technical; The book is written for a general, non-specialist audience, and the approach is non-technical The instruments presented aren't so very far out: most of them, by design, relate closely to familiar instrument types and are playable as such. Yet even experienced experimenters will find some new ideas here. It's hardbound, with 144 big and very full pages, lots of color, beautiful photos & illustrations; price $24.95.Order from Experimental Musical Instruments, PO Box 784, Nicasio, CA 94946, USA, phone (415) 662-2182. Or, if you gotta use Mastercard or Visa, order direct from Lark at (800) 284-3388. [10-4]

AIR COLUMNS AND TONEHOLES: PRINCIPLES OF WIND INSTRUMENT DESIGN is a spiral-bound booklet containing the four articles on practical wind instrument acoustics by Bart Hopkin that appeared in EMI in 1992 and 1993. The articles have been much revised and improved, and there

are several additional features included. Published by Tai Hei Shakuhachi; available for $12.50 (no additional postage required) from Tai Hei Shakuhachi, PO Box 294C, Willits, CA 95490, or from EMI, Box 784, Nicasio, CA 94946. [9-4]

A REMINDER Unclassified ads here in EMI's notices column are free to subscribers for up to 40 words; 40¢ per word thereafter. For others they are 40¢ per word, 15 word minimum, with a 20% discount on orders of four or more insertions of the same ad.

SUBSCRIPTIONS TO EMI: $24/yr for U.S.; $27/yr for Canada & Mexico; $34/yr overseas. California residents add 7.25% sales tax for a total of $25.74. Order from EMI, Box 784, Nicasio, CA 94946, USA.

EMI BACK ISSUES: Bound volume sets Vol 1 through Vol 9, and Vol. 10 after Sept. 1995: $17 per volume. Each volume set contains all of the issues of one volume year, photocopied and bound under one cover. The photocopies are a step down in quality from the original press runs, but they are readable still. The price includes postage for U.S., Canada & Mexico air, and overseas surface rate. For overseas air add 20%. In California add 7.25% sales tax. Order from EMI, PO Box 784, Nicasio, CA 94946, or write for complete listing of back issues and their contents. Corresponding cassette tapes also available for later volumes; see information below.

CASSETTE TAPES FROM EMI: $8 per cassette for subscribers; $10.50 for non-subscribers. Prices include postage for air delivery in U.S., Canada and Mexico, or surface delivery overseas. In California add 7.25% sales tax. For overseas air add $20%. Each tape contains music of instruments that appeared in the newsletter during the corresponding volume year, comprising a full measure of odd, provocative, funny and beautiful music. Volumes VI, VII, VIII and 9 remain available. Earlier volumes are now sold out. Order from EMI, Box 784, Nicasio, CA 94946.

The following is a listing of selected articles relating to musical instruments which have appeared recently in other publications.

"Drones, Chants, and Elbows: A Short Look at the Bagpipe" by Michael Bloom, in **Rhythm Music Magazine** Vol. IV # 2, 1995 (872 Mass Ave, 22, PO Box 391894, Cambridge, MA 02139, USA).

A brief introduction to bagpipes, their many forms, their history, and current directions among players.

"Natural Horn Conversion (a.k.a. Disemboweled Single Horns)" by David Chandler, in **Techni-Com** Vol. 20 #1, Jan-Feb 1995 (PO Box 51, Normal, IL 61761 USA).

The author describes his procedures for converting old or damaged French horns into natural (valveless) horns.

"A Tale of Three Harps" by Douglas C. Peterson, MD, in **Folk Harp Journal #85 and #86, Fall & Winter 1994 (4718 Maychelle Dr., Anaheim CA 92807-3040 USA).**

A practical overview on aspects of harp construction, based in the author's experience in building harps following plans from each of three harp designers. The article is in two parts, appearing in two issues.

"One Person's Junk", in the "Bull Session" column by Keith Thompson in **Model Railroader**, May 1994.

Photo and brief background information on model locomotives on a fairly large scale (8 ft) made by Aldo Alzapiedi of Clifton, NJ. The locomotives are made primarily of cast-off materials, and a variety of musical instruments feature prominently in at least one of them.

"Madrid – Acoustic Dimensions of Inhabited Areas: Quality Criteria" by Isabel Lopez Barrio and Jose Carlés, in **The Soundscape Newsletter** #10, February 1995 (Simon Fraser University, School of Communication, Burnaby, BC, V5A 1S6, Canada).

The authors discuss their work in integrating the aesthetics of soundscape work with traditional noise studies for the urban environment of Madrid.

"De Pneumafonen op de Nacht van Radio 3" by Godfried-Willem Raes and Moniek Darge, in **Logos-Blad** 16 #12, 1994 (Kongostraat 35,9000 Gent, Belgium).

"Pneumafoons" is the name given by Godfried-Willem Raes and Moniek Darge to their collection of pneumatic sound instruments sounded (in their original incarnation, at least) by air pressure by people lounging around on inflatable pillows.

"Gimme Fives" by Paul Rapaport, in **Musicworks** 61 (179 Richmond St. West, Toronto, Ontario, Canada, M5V 1V3).

A discussion of equal temperaments (musical scales in which the scale steps are equally spaced) other than the familiar 12-tone equal temperament.

"Cruising for a Fixing in this 'Art of Fixed Sounds'" by Darren Copeland, also in **Musicworks** 61 (address above).

A "plea for a high realism in the sonic arts" – notes on how increased awareness of both the information content of sounds and the quality of sounds as percepts can lead to an "imagistic sonic art."

1/1 Vol. 8 #4, November 1994 (535 Stevenson St., San Francisco, CA 94103, USA) bears the heading "Remembering Harry Partch." The issue is devoted to essays from a handful of individuals for whom Partch and his legacy have been important, including John Schneider, Dean Drummond, Peter Garland, Ben Johnston, John Chalmers, Lynn Ludlow, Stephen Schwartz, Stephen Puliot, and Jef Raskin.

American Lutherie #40, Winter 1994 (8222 South Park Ave., Tacoma, WA 98408-5226) contains a range of articles on string instrument making, including –

"Segovia's 1912 Manuel Ramírez" by R.E. Bruné: A description of and plans for one of Segovia's guitars.

"Two Travel Guitars and their Makers" by Jonathan Peterson: Interviews with Larry Roberts and Rossco Wright, makers of guitars of normal string scale length, but designed to be collapsible or extremely compact for portability.

"Fingerboard Materials: A Semiscientific Survey" by Fred Casey: A comparison of the strength, rigidity, and density of several materials used for fingerboards, including common fingerboard woods, plus the synthetic called "phenolic" in the article.

Woodwind Quarterly #8, February 1995 (1513 Old CC Rd., Colville, WA 99114 USA) contains a range of articles on woodwind making, including –

"Pennywhistle" by the Thin Weasel: Four pages of practical how-two on making a simple, cylindrical fipple flute.

"Making a Recorder" by Luke Goembel: 25 pages, with lots of photographs, of practical instructions on recorder making start to finish.

"A-440 and Other Matters" by Alec V. Loretto: Notes on pitch standards, historical and modern, as they concern wind instrument makers, plus some history on the use of plastics in recorder making.

And, in the letters section, an informative and fairly extensive letter from Dennis Murphy on wind instruments made from PVC plastic.

Leonardo Music Journal Volume 4, 1994 (MIT Press Journals, 55 Hayward St., Cambridge, MA 02142-9902, USA) contains a range of articles, including –

"Music from the Center of the Earth: Three Large-Scale Sound Installations" by Alvin Curran, with Technical Appendixes by Stefan Tiedje and Tim Walters: Descriptions of three environmental installations (only one of which, apparently, had been completed at the time of writing) involving loudspeakers carefully located in specific environments and configurations, controlled by computers and other electronic systems to allow for various sorts of interaction with observers both passive and active.

"Interactive Radio" by Greg Schiemer: descriptions of a moving concert produced by bicycle riders with radios, and an interactive radio broadcast in which callers to the broadcast station were able, through MIDI and computer technology, to influence the ongoing broadcast performance of a Disklavier (MIDI-controllable acoustic piano).

"The Fusion and Layering of Noise and Tone: Implications for Timbre in African Instruments" by Cornelia Fales and Stephen McAdams: A study of the interaction of unpitched noise and clearly pitched tone in instruments having a blend of the two – see the discussion of this article under "Notes from Here and There" following the Letters section in this issue of *EMI*.